CLAIMS

1. An authentication apparatus operative to determine the authenticity of a polymer film, comprising an optically-based birefringence measuring arrangement operative to measure a first effect influenced by a birefringence characteristic of said film from a first angle comprising a non-normal angle to a plane of said film, and at least one of: a second angle; and a third angle; and wherein said apparatus is operative to:

compare a value, or range of values, representative of said first effect as measured from said first angle with a value, or range of values representative of a specified first effect corresponding to a predetermined birefringence characteristic of an authentic polymer film for said first angle;

compare a value, or range of values, representative of said first effect as measured from said at least one of said second and third angles with a value, or range of values representative of a specified first effect corresponding to a predetermined birefringence characteristic of an authentic polymer film for respective second and/or third angles; and

output an authenticity signal indicative of authenticity or otherwise of said film based upon said comparisons.

2. An apparatus according to Claim 1, wherein said second angle comprises a non-normal angle to a plane of said film and said third angle comprises a normal angle to a plane of said film.

3. An apparatus according to claim 1, wherein said apparatus is operative to differentiate between films made by a bubble process and films made by a different process.

4. An apparatus according to Claim 1, wherein said optically-based birefringence measuring arrangement comprises an emitter located, and operative, to illuminate a first side of said film located in a measuring region of said apparatus with electromagnetic radiation; a first polariser

located between said first emitter and said first side of said film so that at least a portion of electromagnetic radiation emitted by said first emitter passes therethrough; a first detector located on a second side of said film, and operative to receive electromagnetic radiation from said emitter transmitted through said film and transmitted from said second side of said film at said first angle and at least one of said second and third angles; a second polariser located between said second side of said film and said first detector so that at least a portion of electromagnetic radiation transmitted through said film passes therethrough, wherein said first detector is operative to output a signal representative of said first effect as measured based upon electromagnetic radiation transmitted from said second side of said film at said first angle and at least one of said second and third angles.

5. An apparatus according to Claim 4, wherein said first detector is movable relative to said second side of said film for location at a first position to receive electromagnetic radiation from said emitter transmitted through said film and transmitted from said second side of said film at said first angle, and further movable to a second and/or third position to receive electromagnetic radiation from said emitter transmitted through said film and transmitted from said second side of said film at respective said second and/or third angles.

6. An apparatus according to Claim 4 further comprising:

a second detector located on a second side of said film, and operative to receive electromagnetic radiation from said emitter transmitted through said film and transmitted from said second side of said film at said second angle; and/or

a third detector located on a second side of said film, and operative to receive electromagnetic radiation from said emitter transmitted through said film and transmitted from said second side of said film at said third angle;

wherein:

said second detector is operative to output a signal representative of said first effect as measured based upon electromagnetic radiation transmitted from said second side of said film at said second angle; and/or

said third detector is operative to output a signal representative of said first effect as measured based upon electromagnetic radiation transmitted from said second side of said film at said third angle.

7. An apparatus according to Claim 1, wherein said first angle comprises one of: (i) that described by vector [101] with respect to the film; and (ii) that described by vector [111] with respect to the film.

8. An apparatus according to Claim 7, wherein said second angle comprises the other of: (i) that described by vector [101] with respect to the film; and (ii) that described by vector [111] with respect to the film.

9. An apparatus according to Claim 4, wherein an output signal output by said first detector is proportional to an intensity of transmitted electromagnetic radiation received.

10. An apparatus according to Claim 9, wherein said first detector is operative to communicate said output signal to a processor which is operative to compare a value of said output signal representative of said first effect as measured from said first angle with said value or range of values representative of a specified first effect corresponding to a predetermined birefringence characteristic of an authentic polymer film for said first angle..

11. An apparatus according to Claim 10, wherein said value or range of values comprises at least one expected first detector output signal value representative of electromagnetic radiation transmitted from said second

side of said film at said first angle and received by said first detector if an authentic film is located in said measuring region.

12. An apparatus according to Claim 6, wherein an output signal output by said second detector and/or said third detector is proportional to an intensity of transmitted electromagnetic radiation received.

13. An apparatus according to Claim 12, wherein:

said second detector is operative to communicate said output signal to a processor which is operative to compare a value of said output signal representative of said first effect as measured from said second angle with said value or range of values representative of a specified first effect corresponding to a respective predetermined birefringence characteristic of an authentic polymer film for said second angle; and/or

said third detector is operative to communicate said output signal to a processor which is operative to compare a value of said output signal representative of said first effect as measured from said third angle with said value or range of values representative of a specified first effect corresponding to a respective predetermined birefringence characteristic of an authentic polymer film for said third angle..

14. An apparatus according to Claim 13, wherein:

said value or range of values comprises at least one expected second detector output signal value representative of electromagnetic radiation transmitted from said second side of said film and received by said second detector if an authentic film is located in said measuring region; and/or

said value or range of values comprises at least one expected third detector output signal value representative of electromagnetic radiation transmitted from said second side of said film and received by said third detector if an authentic film is located in said measuring region.

15. A method of determining the authenticity of a polymer film, comprising:

measuring a first effect influenced by a birefringence characteristic of said film from a first angle comprising a non-normal angle to a plane of said film, and at least one of: a second angle; and a third angle;

comparing a value, or range of values, representative of said first effect as measured from said first angle with a value, or range of values representative of a specified first effect corresponding to a predetermined birefringence characteristic of an authentic polymer film for said first angle;

comparing a value, or range of values, representative of said first effect as measured from said at least one of said second and third angles with a value, or range of values representative of a specified first effect corresponding to a predetermined birefringence characteristic of an authentic polymer film for respective second and/or third angles; and

outputting an authenticity signal indicative of authenticity or otherwise of said film based upon said comparisons.

CLAIMS

1. An authentication apparatus operative to determine the authenticity of a polymer film, comprising an optically-based birefringence measuring arrangement operative to measure a first effect influenced by a birefringence characteristic of said film from a first angle comprising a non-normal angle to a plane of said film, and at least one of: a second angle; and a third angle; and wherein said apparatus is operative to:

compare a value, or range of values, representative of said first effect as measured from said first angle with a value, or range of values representative of a specified first effect corresponding to a predetermined birefringence characteristic of an authentic polymer film for said first angle;

compare a value, or range of values, representative of said first effect as measured from said at least one of said second and third angles with a value, or range of values representative of a specified first effect corresponding to a predetermined birefringence characteristic of an authentic polymer film for respective second and/or third angles; and

output an authenticity signal indicative of authenticity or otherwise of said film based upon said comparisons.

2. An apparatus according to Claim 1, wherein said second angle comprises a non-normal angle to a plane of said film and said third angle comprises a normal angle to a plane of said film.

3. An apparatus according to claim 1 or 2, wherein said apparatus is operative to differentiate between films made by a bubble process and films made by a different process.

4. An apparatus according to any one of the preceding claims, wherein said optically-based birefringence measuring arrangement comprises an emitter located, and operative, to illuminate a first side of said film located in a measuring region of said apparatus with

electromagnetic radiation; a first polariser located between said first emitter and said first side of said film so that at least a portion of electromagnetic radiation emitted by said first emitter passes therethrough; a first detector located on a second side of said film, and operative to receive electromagnetic radiation from said emitter transmitted through said film and transmitted from said second side of said film at said first angle and at least one of said second and third angles; a second polariser located between said second side of said film and said first detector so that at least a portion of electromagnetic radiation transmitted through said film passes therethrough, wherein said first detector is operative to output a signal representative of said first effect as measured based upon electromagnetic radiation transmitted from said second side of said film at said first angle and at least one of said second and third angles.

5. An apparatus according to Claim 4, wherein said first detector is movable relative to said second side of said film for location at a first position to receive electromagnetic radiation from said emitter transmitted through said film and transmitted from said second side of said film at said first angle, and further movable to a second and/or third position to receive electromagnetic radiation from said emitter transmitted through said film and transmitted from said second side of said film at respective said second and/or third angles.

6. An apparatus according to Claim 4further comprising:

a second detector located on a second side of said film, and operative to receive electromagnetic radiation from said emitter transmitted through said film and transmitted from said second side of said film at said second angle; and/or

a third detector located on a second side of said film, and operative to receive electromagnetic radiation from said emitter transmitted through

said film and transmitted from said second side of said film at said third angle;

wherein:

said second detector is operative to output a signal representative of said first effect as measured based upon electromagnetic radiation transmitted from said second side of said film at said second angle; and/or

said third detector is operative to output a signal representative of said first effect as measured based upon electromagnetic radiation transmitted from said second side of said film at said third angle.

7. An apparatus according to any one of the preceding claims, wherein said first angle comprises one of: (i) that described by vector [101] with respect to the film; and (ii) that described by vector [111] with respect to the film.

8. An apparatus according to Claim 7,any one of the preceding claims, wherein said second angle comprises the other of: (i) that described by vector [101] with respect to the film; and (ii) that described by vector [111] with respect to the film.

9. An apparatus according to any one of Claims 4 to 8, wherein an output signal output by said first detector is proportional to an intensity of transmitted electromagnetic radiation received.

10. An apparatus according to Claim 9, wherein said first detector is operative to communicate said output signal to a processor which is operative to compare a value of said output signal representative of said first effect as measured from said first angle with said value or range of values representative of a specified first effect corresponding to a predetermined birefringence characteristic of an authentic polymer film for said first angle..

11. An apparatus according to Claim 10, wherein said value or range of values comprises at least one expected first detector output signal value representative of electromagnetic radiation transmitted from said second side of said film at said first angle and received by said first detector if an authentic film is located in said measuring region.

12. An apparatus according to Claim 6, or any one of Claims 7 to 11 when directly or independently dependent upon Claim 6, wherein an output signal output by said second detector and/or said third detector is proportional to an intensity of transmitted electromagnetic radiation received.

13. An apparatus according to Claim 12, wherein:

said second detector is operative to communicate said output signal to a processor which is operative to compare a value of said output signal representative of said first effect as measured from said second angle with said value or range of values representative of a specified first effect corresponding to a respective predetermined birefringence characteristic of an authentic polymer film for said second angle; and/or

said third detector is operative to communicate said output signal to a processor which is operative to compare a value of said output signal representative of said first effect as measured from said third angle with said value or range of values representative of a specified first effect corresponding to a respective predetermined birefringence characteristic of an authentic polymer film for said third angle..

14. An apparatus according to Claim 13, wherein:

said value or range of values comprises at least one expected second detector output signal value representative of electromagnetic radiation transmitted from said second side of said film and received by said second detector if an authentic film is located in said measuring region; and/or

said value or range of values comprises at least one expected third detector output signal value representative of electromagnetic radiation transmitted from said second side of said film and received by said third detector if an authentic film is located in said measuring region.

15. An apparatus according to any one of the preceding claims, further comprising an optically-based measuring arrangement operative to measure, at said first angle comprising a non-normal angle to a plane of said film, and at least one of said second angle and said third angle, a second effect influenced by at least one other optical characteristic of said film, and wherein said apparatus is operative to:

compare a value, or range of values, representative of said second effect as measured at said first angle comprising a non-normal angle to a plane of said film, and at least one of said second angle and said third angle with a value, or range of values, representative of a specified second effect corresponding to a predetermined other optical characteristic of an authentic polymer film for a respective said first angle and respective second and/or third angles and

output an authenticity signal indicative of authenticity or otherwise of said film based upon:

a birefringence measurement comparison according to any one of the preceding claims; and/or

said comparison of said value, or range of values, of said second effect as measured at said first angle comprising a non-normal angle to a plane of said film, and at least one of said second angle and said third angle with a respective value, or range of values, representative of said specified second effect corresponding to a predetermined other optical characteristic of an authentic polymer film for a respective said first angle and respective second and/or third angles.

16. An apparatus according to Claim 15, when directly or indirectly dependent upon claim 4, wherein said second polariser is controllably orientable so as to effect polarisation in one of: a first direction transverse to that of the first polariser; and a second direction the same as that of the first polariser; wherein said first detector, and/or optionally second and/or third detectors, is operative to measure said first effect influenced by said birefringence characteristic of said film when said second polariser is oriented so as to effect polarisation in said first direction transverse to that of the first polariser and to measure said second effect influenced by said other optical characteristic of said film when said second polariser is oriented so as to effect polarisation in said second direction the same as that of the first polariser.

17. An apparatus according to Claim 16, wherein said first detector, and/or optionally second and/or third detectors, is operative to output a first signal representative of said first effect as measured and to output a second signal representative of said second effect as measured.

18. An apparatus according to Claim 17, wherein said first and second output signals output by said first detector, and/or optionally second and/or third detectors, are proportional to an intensity of transmitted electromagnetic radiation received.

19. An apparatus according to Claim 17 or 18, wherein said first detector, and/or optionally second and/or third detectors, is operative to communicate said first and second output signals to a processor which is operative to:

compare a value of said first output signal with a value, or range of values, representative of said specified first effect; and

compare a value of said second output signal with a value, or range of values, representative of said specified second effect corresponding to a predetermined film transmissivity.

20. An apparatus according to Claim 19, wherein if said first output signal value, or range of values, is of a level which is indistinguishable from a first output signal value, or range of values, representative of an effect influenced by background conditions, said processor is operative to output said authenticity signal based upon a comparison of said value, or range of values, of said second output signal with said value, or range of values, representative of said specified second effect.

21. An apparatus according to Claim 19 or 20, wherein said value or range of values comprises at least one expected first detector, and/or optionally second and/or third detectors, output signal value representative of electromagnetic radiation transmitted from said second side of said film and received by said first detector, and/or optionally second and/or third detectors, when said second polariser is oriented so as to effect polarisation in said first direction and in said second direction respectively if an authentic film is located in said measuring region.

22. An apparatus according to any one of claims 19 to 21, wherein said processor is operative to:

calculate a difference value between a value of said first output signal and a value of said second output signal;

calculate a modified difference value by halving said difference value;

calculate a birefringence representative value by subtracting said modified difference value from said second output signal value;

compare said birefringence representative value to said value, or range of values, representative of said specified first effect; and

output said authenticity signal indicative of authenticity or otherwise of said film based upon said comparison.

23. An apparatus according to any one of the preceding claims, wherein said optically-based birefringence measuring arrangement is further operative to measure a third effect influenced by said birefringence characteristic of said film over at least a portion of an electromagnetic spectrum and at said first angle and at least one of said second and third angles, and wherein said apparatus is operative to:

compare a value, or range of values, representative of said third effect as measured at said first angle and at least one of said second and third angles with a respective value, or range of values, representative of a specified third effect corresponding to a predetermined birefringence characteristic of an authentic polymer film for a same at least a portion of an electromagnetic spectrum at a respective said first angle and respective second and/or third angles; and

output an authenticity signal indicative of authenticity or otherwise of said film based upon said comparison.

24. An authentication apparatus according to Claim 23, wherein measurement of said third effect comprises a monochromatic measurement.

25. An apparatus according to Claim 23or 24, when directly or indirectly dependent upon Claim 4, wherein said first detector, and/or optionally second and/or third detectors, is configured for selective response to said at least a portion of an electromagnetic spectrum.

26. An apparatus according to Claim 25, wherein said first detector, and/or optionally second and/or third detectors, is controllable to alter a detection range thereof to correspond to said at least a portion of an electromagnetic spectrum.

27. An apparatus according to Claim 25, wherein said first detector, and/or optionally second and/or third detectors, is pre-selected to detect

electromagnetic radiation from said at least a portion of an electromagnetic spectrum.

28. An apparatus according to any one of Claims 23 to 27, when directly or indirectly dependent upon Claim 4, wherein said first detector, and/or optionally each of second and/or third detectors, comprises an array of at least two sub-detectors, a first of said at least two sub-detectors being operative to detect electromagnetic radiation from a first portion of an electromagnetic spectrum, and a second of said at least two sub-detectors being operative to detect electromagnetic radiation from a second portion of said electromagnetic spectrum.

29. An apparatus according to Claim 28, wherein said first sub-detector is controllable to alter a detection range thereof to correspond to said first portion of an electromagnetic spectrum , and said second sub-detector is controllable to alter a detection range thereof to correspond to said second portion of an electromagnetic spectrum .

30. An apparatus according to Claim 28, wherein said first sub-detector is pre-selected to detect electromagnetic radiation from said first portion of an electromagnetic spectrum and said second sub-detector is pre-selected to detect electromagnetic radiation from said second portion of an electromagnetic spectrum.

31. An apparatus according to any one of Claims 23 to 27, when directly or indirectly dependent upon Claim 4, further comprising at least one filter arranged to mask at least another portion of said electromagnetic spectrum and to transmit said at least a portion of an electromagnetic spectrum for reception by said first detector, and/or optionally second and/or third detectors.

32. An apparatus according to any one of Claims 23 to 31, when directly or indirectly dependent upon Claim 4, wherein said emitter, or optionally emitters, is controllable to emit electromagnetic radiation in said at least a portion of an electromagnetic spectrum.

33. An apparatus according to any one of Claims 23 to 31, when directly or indirectly dependent upon Claim 5, wherein said emitter, or optionally emitters, is pre-selected to emit electromagnetic radiation in said at least a portion of an electromagnetic spectrum.

34. An apparatus according to claim 32 or 33, wherein said emitter, or optionally emitters, is operative in a first mode to emit white-light and in a second mode to emit coloured light.

35. An apparatus according to claim 32 or 33, wherein said apparatus is operative in a first mode to control a first emitter to emit white-light and in a second mode to control a second emitter to emit coloured light.

36. An apparatus according to claim 34 or 35, wherein in said first mode said apparatus is operative to indicate if said polymer film under test comprises a polymer film of a first genuine type or at least a second genuine type based upon an output signal of said first detector, and further wherein, responsive to an output signal indicating that said polymer under test is of a type other than said first genuine type, said apparatus is operative to implement said second mode and to indicate if said polymer film under test comprises a polymer film of said at least a second genuine type or otherwise based upon said output signals of said first detector in both said first and second modes.

37. An apparatus according to claim 36, wherein in said first mode said apparatus is operative to:

compare said value, or range of values, representative of said third effect as measured at said first angle and at least one of said second and third angles with said value, or range of values, representative of a specified third effect corresponding to a predetermined birefringence characteristic of a polymer film of a first genuine type at a respective said first angle and respective second and/or third angles; and;

output a classification signal indicative of said film comprising a first genuine type or otherwise based upon said comparison.

38. An apparatus according to claim 37, wherein said apparatus is operative to output a classification signal indicative of said film comprising a first genuine type if said value representative of said third effect as measured at said first, second or third angle is lower than a corresponding first mode first threshold value for said first, second or third angle representative of an upper limit for said specified first effect for a film of said first genuine type.

39. An apparatus according to claim 38, wherein said apparatus is operative to output a classification signal indicative of said film comprising a non-genuine type if said value representative of said third effect as measured at said first, second or third angle is both higher than said corresponding first mode first threshold value for said first, second or third angle and outside a range of values between a corresponding first mode second threshold value for said first, second or third angle and a corresponding first mode third threshold value for said first, second or third angle.

40. An apparatus according to claim 39, wherein said apparatus is operative to implement said second mode if said value representative of said third effect as measured at said first, second or third angle in said first mode is between said corresponding first mode second threshold value for

said first, second or third angle and said corresponding first mode third threshold value for said first, second or third angle.

41. An apparatus according to claim 40, wherein said apparatus is operative to output a classification signal indicative of said film comprising a second genuine type if said value representative of said third effect as measured at said first, second or third angle is within a range of values between a corresponding second mode first threshold value for said first, second or third angle and a corresponding second mode second threshold value for said first, second or third angle, said range of values representative of a specified third effect for a film of said second genuine type.

42. An apparatus according to any one of the preceding claims, further comprising an optically-based birefringence imaging arrangement for imaging a birefringence pattern of said film at said first angle and at least one of said second and third angles, and wherein said apparatus is operative to:

compare an image of said birefringence pattern with a respective image representative of a predetermined birefringence pattern of an authentic polymer film at a respective said first angle and respective said second and third angles; and

output an authenticity signal indicative of authenticity or otherwise of said film based upon said comparison.

43. An apparatus according to claim 42, wherein said optically-based birefringence imaging arrangement comprises an emitter located, and operative, to illuminate a first side of said film located in a measuring region of said apparatus with electromagnetic radiation; a first polariser located between said first emitter and said first side of said film so that at least a portion of electromagnetic radiation emitted by said first emitter passes therethrough; an imaging device located on a second side of said

film, and operative to receive electromagnetic radiation from said emitter transmitted through said film and transmitted from said second side of said film; a second polariser located between said second side of said film and said imaging device so that at least a portion of electromagnetic radiation transmitted through said film passes therethrough, wherein said imaging device is operative to output data representative of an imaged birefringence pattern based upon electromagnetic radiation transmitted from said second side of said film and received at said imaging device.

44. An apparatus according to claim 43, wherein said imaging device is operative to output said data representative of an imaged birefringence pattern to a processor which is operative to compare said output data with a data-set representative of a predetermined birefringence pattern.

45. An apparatus according to Claim 43 or 44, wherein at least one of: said emitter; said first polariser; and said second polariser is/are common with that/those of said optically-based birefringence measuring arrangement and/or of said optically-based measuring arrangement.

46. An apparatus according to any one of claims 43 to 45, wherein said emitter comprises a white-light source.

47. An apparatus according to any one of claims 43 to 46 wherein said imaging device comprises a photosensitive array.

48. An apparatus according to any one of the preceding claims, further comprising an optical response modifier arranged to modify said first effect to introduce an offset of a predetermined amount to said value, or range of values, representative of said effect as measured, wherein said optically-based birefringence measuring arrangement is operative to measure said first effect as modified.

49. An apparatus according to Clam 48, when directly or indirectly dependent upon Claim 4, wherein said optical response modifier is located in a beam path of electromagnetic radiation between said emitter and said first detector, and/or optionally second and/or third detectors, and further wherein said first detector, and/or optionally second and/or third detectors, is operative to measure said first effect .

50. An apparatus according to Claim 49, wherein said first detector, and/or optionally second and/or third detectors, is operative to output a signal representative of said first effect as modified.

51. An apparatus according to claim 49 or 50, wherein said first detector, and/or optionally second and/or third detectors, is operative to communicate said output signal to a processor which is operative to compare a value of said output signal representative of said first effect as modified with a value or range of values representative of a specified first effect corresponding to a predetermined birefringence characteristic of an authentic polymer film and as modified by a same optical response modifier.

52. An apparatus according to any one of the preceding claims, wherein said apparatus is operative to receive an item comprising a polymer film forming at least a portion of a substrate of said item.

53. A banknote authentication apparatus comprising an apparatus according to any one of the preceding claims, wherein said apparatus is operative to determine the authenticity of a banknote comprising a polymer film forming at least a portion of a substrate of said banknote.

54. Use of the apparatus according to any one of claims 1 to 52 to determine the authenticity of a polymer film.

55. A method of determining the authenticity of a polymer film, comprising:

measuring a first effect influenced by a birefringence characteristic of said film from a first angle comprising a non-normal angle to a plane of said film, and at least one of: a second angle; and a third angle;

comparing a value, or range of values, representative of said first effect as measured from said first angle with a value, or range of values representative of a specified first effect corresponding to a predetermined birefringence characteristic of an authentic polymer film for said first angle;

comparing a value, or range of values, representative of said first effect as measured from said at least one of said second and third angles with a value, or range of values representative of a specified first effect corresponding to a predetermined birefringence characteristic of an authentic polymer film for respective second and/or third angles; and

outputting an authenticity signal indicative of authenticity or otherwise of said film based upon said comparisons.

56. A method according to Claim 55, wherein said second angle comprises a non-normal angle to a plane of said film and said third angle comprises a normal angle to a plane of said film.

57. A method according to claim 55 or 56, further comprising indicating if said polymer film is made by a bubble process or by a different process.

58. A method according to any one of claims 55 to 57, further comprising:

illuminating a first side of said film located in a measuring region of said apparatus with electromagnetic radiation polarised by a first polariser located between a first emitter and said first side of said film so that at least a portion of electromagnetic radiation emitted by said first emitter passes therethrough;

receiving, at a first detector located on a second side of said film, electromagnetic radiation from said emitter transmitted through said film at said first angle and at least one of said second and third angles and polarised by a second polariser located between said second side of said film and said first detector; and

outputting a signal representative of said first effect as measured based upon electromagnetic radiation transmitted from said second side of said film at said first angle and at least one of said second and third angles.

59. A method according to Claim 58, further comprising locating said first detector at a first position to receive electromagnetic radiation from said emitter transmitted through said film and transmitted from said second side of said film at said first angle, and moving said first detector to a second and/or third position to receive electromagnetic radiation from said emitter transmitted through said film and transmitted from said second side of said film at respective said second and/or third angles.

60. A method according to Claim 58, further comprising:

providing a second detector on a second side of said film for receiving electromagnetic radiation from said emitter transmitted through said film and transmitted from said second side of said film at said second angle; and/or providing a third detector located on a second side of said film for receiving electromagnetic radiation from said emitter transmitted through said film and transmitted from said second side of said film at said third angle; and

outputting, from said second detector, a signal representative of said first effect as measured based upon electromagnetic radiation transmitted from said second side of said film at said second angle; and/or

outputting, from said third detector, a signal representative of said first effect as measured based upon electromagnetic radiation transmitted from said second side of said film at said third angle.

61. A method according to any one of claims 55 to 60, wherein said first angle comprises one of: (i) that described by vector [101] with respect to the film; and (ii) that described by vector [111] with respect to the film.

62. A method according to Claim 61, wherein said second angle comprises the other of: (i) that described by vector [101] with respect to the film; and (ii) that described by vector [111] with respect to the film.

63. A method according to any one of Claims 55 to 62, further comprising:

communicating said output signal to a processor;

comparing a value of said output signal representative of said first effect as measured from said first angle with said value or range of values representative of a specified first effect corresponding to a predetermined birefringence characteristic of an authentic polymer film for said first angle.

64. A method according to Claim 63, wherein said value or range of values comprises at least one expected first detector output signal value representative of electromagnetic radiation transmitted from said second side of said film at said first angle and received by said first detector if an authentic film is located in said measuring region.

65. A method according to Claim 60, or any one of Claims 61 to 64 when directly or independently dependent upon Claim 60, wherein an output signal output by said second detector and/or said third detector is proportional to an intensity of transmitted electromagnetic radiation received.

66. A method according to Claim 65, further comprising:

communicating said output signal from said second detector to said processor;

comparing a value of said output signal representative of said first effect as measured from said second angle with said value or range of values representative of a specified first effect corresponding to a respective predetermined birefringence characteristic of an authentic polymer film for said second angle; and/or

communicating said output signal from said third detector to said processor;

comparing a value of said output signal representative of said first effect as measured from said third angle with said value or range of values representative of a specified first effect corresponding to a respective predetermined birefringence characteristic of an authentic polymer film for said third angle.

67. A method according to Claim 66, wherein:

said value or range of values comprises at least one expected second detector output signal value representative of electromagnetic radiation transmitted from said second side of said film and received by said second detector if an authentic film is located in said measuring region; and/or

said value or range of values comprises at least one expected third detector output signal value representative of electromagnetic radiation transmitted from said second side of said film and received by said third detector if an authentic film is located in said measuring region.

68. A method according to any one of claims 55 to 67, further comprising:

measuring, at said first angle comprising a non-normal angle to a plane of said film, and at least one of said second angle and said third angle, a second effect influenced by at least one other optical characteristic of said film;

comparing a value, or range of values, representative of said second effect as measured at said first angle and at least one of said

second angle and said third angle, with a value, or range of values, representative of a specified second effect corresponding to a predetermined other optical characteristic of an authentic polymer film at a respective said first angle and a respective said second angle and/or third angle; and

outputting an authenticity signal indicative of authenticity or otherwise of said film based upon:

a birefringence measurement comparison according to any one of the preceding claims; and/or

said comparison of said value, or range of values, of said second effect as measured at said first angle and at least one of said second and third angles with a respective value, or range of values, representative of said specified second effect corresponding to a predetermined other optical characteristic at a respective said first angle and respective second and/or third angles.

69. A method according to Claim 68, when directly or indirectly dependent upon claim 58, further comprising:

orienting said second polariser so as to effect polarisation in one of: a first direction transverse to that of the first polariser; and a second direction the same as that of the first polariser;

measuring said first effect influenced by said birefringence characteristic of said film when said second polariser is oriented so as to effect polarisation in said first direction transverse to that of the first polariser and measuring said second effect influenced by said other optical characteristic of said film when said second polariser is oriented so as to effect polarisation in said second direction the same as that of the first polariser.

70. A method according to Claim 69, further comprising outputting a first signal representative of said first effect as measured and outputting a second signal representative of said second effect as measured.

71. A method according to Claim 70, wherein said first and second output signals output by said first detector, and/or optionally second and/or third detectors, are proportional to an intensity of transmitted electromagnetic radiation received.

72. A method according to Claim 70 or 71, further comprising communicating said first and second output signals to a processor and:

comparing a value of said first output signal with a value, or range of values, representative of said specified first effect; and

comparing a value of said second output signal with a value, or range of values, representative of said specified second effect corresponding to a predetermined film transmissivity.

73. A method according to Claim 72, wherein if said first output signal value, or range of values, is of a level which is indistinguishable from a first output signal value, or range of values, representative of an effect influenced by background conditions, said processor is operative to output said authenticity signal based upon a comparison of said value, or range of values, of said second output signal with said value, or range of values, representative of said specified second effect.

74. A method according to Claim 72 or 73, wherein said value or range of values comprises at least one expected first detector, and/or optionally second and/or third detectors, output signal value representative of electromagnetic radiation transmitted from said second side of said film and received by said first detector, and/or optionally second and/or third detectors, when said second polariser is oriented so as to effect

polarisation in said first direction and in said second direction respectively if an authentic film is located in said measuring region.

75. A method according to any one of claims 72 to 74, further comprising:

calculating a difference value between a value of said first output signal and a value of said second output signal;

calculating a modified difference value by halving said difference value;

calculating a birefringence representative value by subtracting said modified difference value from said second output signal value;

comparing said birefringence representative value to said value, or range of values, representative of said specified first effect; and

outputting said authenticity signal indicative of authenticity or otherwise of said film based upon said comparison.

76. A method according to any one of claims 55 to 75, further comprising:

measuring a third effect influenced by said birefringence characteristic of said film over at least a portion of an electromagnetic spectrum and at said first angle and at least one of said second angle and said third angle;

comparing a value, or range of values, representative of said third effect as measured at said first angle and said second and/or third angles with a respective value, or range of values, representative of a specified third effect corresponding to a predetermined birefringence characteristic of an authentic polymer film for a same at least a portion of an electromagnetic spectrum at a respective said first angle and respective said second and/or third angles; and

outputting an authenticity signal indicative of authenticity or otherwise of said film based upon said comparison.

77. A method according to Claim 76, wherein measurement of said third effect comprises a monochromatic measurement.

78. A method according to Claim 76 or 77, when directly or indirectly dependent upon Claim 58, further comprising configuring said first detector, and/or optionally second and/or third detectors, for selective response to said at least a portion of an electromagnetic spectrum.

79. A method according to Claim 78, further comprising controlling said first detector, and/or optionally second and/or third detectors, to alter a detection range thereof to correspond to said at least a portion of an electromagnetic spectrum.

80. A method according to Claim 78, further comprising pre-selecting said first detector, and/or optionally second and/or third detectors, to detect electromagnetic radiation from said at least a portion of an electromagnetic spectrum.

81. A method according to any one of Claims 76 to 80, when directly or indirectly dependent upon Claim 58, further comprising providing an array of at least two sub-detectors as said first detector, and/or optionally each of second and/or third detectors; and

detecting, at a first of said at least two sub-detectors, electromagnetic radiation from a first portion of an electromagnetic spectrum;

detecting, at a second of said at least two sub-detectors, electromagnetic radiation from a second portion of said electromagnetic spectrum.

82. A method according to Claim 81, further comprising controlling said first sub-detector to alter a detection range thereof to correspond to said first portion of an electromagnetic spectrum, and controlling said second

sub-detector to alter a detection range thereof to correspond to said second portion of an electromagnetic spectrum.

83. A method according to Claim 80, further comprising pre-selecting said first sub-detector to detect electromagnetic radiation from said first portion of an electromagnetic spectrum and said second sub-detector to detect electromagnetic radiation from said second portion of an electromagnetic spectrum.

84. A method according to any one of Claims 76 to 83, when directly or indirectly dependent upon Claim 58, further comprising masking at least another portion of said electromagnetic spectrum to transmit said at least a portion of an electromagnetic spectrum for reception by said first detector, and/or optionally second and/or third detectors.

85. A method according to any one of Claims 76 to 84, when directly or indirectly dependent upon Claim 58, further comprising controlling said emitter, or optionally emitters, to emit electromagnetic radiation in said at least a portion of an electromagnetic spectrum.

86. A method according to any one of Claims 76 to 84, when directly or indirectly dependent upon Claim 58, further comprising pre-selecting said emitter, or optionally emitters, to emit electromagnetic radiation in said at least a portion of an electromagnetic spectrum.

87. A method according to claim 85 or 86, further comprising operating said emitter, or optionally emitters, in a first mode to emit white-light and in a second mode to emit coloured light.

88. A method according to claim 85 or 86, further comprising:
controlling a first emitter in a first mode to emit white-light; and

controlling a second emitter in a second mode to emit coloured light.

89. A method according to claim 87 or 88, wherein in said first mode indicating if said polymer film under test comprises a polymer film of a first genuine type or at least a second genuine type based upon an output signal of said first detector, and/or optionally second and/or third detectors, and further wherein, responsive to an output signal indicating that said polymer under test is of a type other than said first genuine type, implementing said second mode and indicating if said polymer film under test comprises a polymer film of said at least a second genuine type or otherwise based upon said output signals of said first detector in both said first and second modes, and/or optionally output signals of said second and/or third detectors in both said first and second modes.

90. A method according to claim 89, wherein in said first mode said method further comprises the steps of:

comparing said value, or range of values, representative of said third effect as measured at said first angle and said second and/or third angles with said value, or range of values, representative of a specified third effect corresponding to a predetermined birefringence characteristic of a polymer film of a first genuine type at a respective said first angle and respective second and/or third angles; and;

outputting a classification signal indicative of said film comprising a first genuine type or otherwise based upon said comparison.

91. A method according to claim 90, further comprising outputting a classification signal indicative of said film comprising a first genuine type if said value representative of said third effect as measured at said first angle and said second and/or third angles is lower than a corresponding first mode first threshold value for said first, second or third angle

representative of an upper limit for said specified first effect for a film of said first genuine type.

92. A method according to claim 91, further comprising outputting a classification signal indicative of said film comprising a non-genuine type if said value representative of said third effect as measured at said first angle and said second and/or third angles is both higher than said corresponding first mode first threshold value for said first, second or third angle and outside a range of values between a corresponding first mode second threshold value for said first, second or third angle and a corresponding first mode third threshold value for said first, second or third angle.

93. A method according to claim 92, further comprising implementing said second mode if said value representative of said third effect as measured at said first angle and said second and/or third angle in said first mode is between said corresponding first mode second threshold value for said first, second or third angle and said first mode third threshold value for said first, second or third angle.

94. A method according to claim 93, further comprising outputting a classification signal indicative of said film comprising a second genuine type if said value representative of said third effect as measured at said first, second or third angle is within a range of values between a corresponding second mode first threshold value for said first, second or third angle and a corresponding second mode second threshold value for said first, second or third angle, said range of values representative of a specified third effect for a film of said second genuine type.

95. A method according to any one of claims 55 to 94, further comprising:

imaging a birefringence pattern of said film at said first angle and at least one of said second and/or third angles;

comparing an image of said birefringence pattern at said first, second or third angle with a respective image representative of a predetermined birefringence pattern of an authentic polymer film at a corresponding first, second and third angle; and

outputting an authenticity signal indicative of authenticity or otherwise of said film based upon said comparison.

96. A method according to claim 95, further comprising outputting, from an imaging device, data representative of an imaged birefringence pattern to a processor and comparing said output data with a data-set representative of a predetermined birefringence pattern.

97. A method according to Claim 95 or 96, further comprising illuminating said film using an emitter comprising a white-light source.

98. A method according to any one of claims 95 to 97, further comprising providing a photosensitive array to implement said imaging step.

99. A method according to any one of claims 55 to 98, further comprising modifying said first effect to introduce an offset of a predetermined amount to said value, or range of values, representative of said first effect as measured at said first angle at said second and/or third angles, and measuring said first effect as modified.

100. A method according to claim 99, further comprising communicating, from said first detector, and/or optionally second and/or third detectors, said output signal to a processor and comparing a value of said output signal representative of said first effect as modified with a value, or range of values, representative of a specified first effect corresponding to a

predetermined birefringence characteristic of an authentic polymer film and as modified by a same optical response modifier.

101. A computer program comprising computer program elements operative in a computer processor to implement one or more aspects of an apparatus in accordance with any one of Claims 1 to 54.

102. A computer program comprising computer program elements operative in a computer processor to implement one or more aspects of a method according to any one of Claims 55 to 100.

103. A computer readable medium carrying a computer program according to Claim 101 or 102.

104. An authentication apparatus substantially as hereinbefore described, with reference to and as illustrated in, any one or more of Figs. 4a to 4b, 5, 6, 7a, 7b, 8, 9, 10 and 13 of the accompanying drawings.

105. A method of determining the authenticity of a polymer film substantially as hereinbefore described with reference to, or as illustrated in, any one or more of Figs. 4a to 4b, 5, 6, 7a, 7b, 8, 9, 10 and 13 of the accompanying drawings.