

What is claimed is:

1. A method of molding an article, said method comprising:
 - providing a composition comprising at least one thermotropic liquid crystalline polymer (TLCP), with the TLCP comprising a plurality of mesogens;
 - providing a mold comprising a mold cavity, with the mold cavity comprising at least one feature cavity, and each feature cavity comprising at least one fine feature chamber;
 - heating the composition so as to form molten composition comprising molten TLCP;
 - filling the mold cavity with a desired amount of the molten composition such that the molten composition filling the at least one fine feature chamber is moving at a flow velocity that causes flow alignment of at least a portion of the mesogens in the corresponding molten TLCP relative to a flow direction of the moving molten composition; and
 - solidifying the molten composition such that mesogens of at least the solidified TLCP in the at least one fine feature chamber substantially maintain their flow alignment.
2. The method of claim 1, wherein said mold cavity further comprises a body cavity, with each feature cavity extending from and being connected with the body cavity so as to allow molten composition to flow from the body cavity into each feature cavity, and said filling the mold cavity comprises:
 - filling the body cavity with a desired amount of the molten composition such that at least a portion of the molten composition filling the body cavity is moving at a first flow velocity that causes flow tumbling of mesogens in the corresponding molten TLCP,
 - wherein the flow velocity of the molten composition filling each fine feature chamber is a second flow velocity that is faster than the first flow velocity.
3. The method of of claim 2, wherein the body cavity corresponds to a body portion of the article being molded.
4. The method of claim 2, wherein the first flow velocity of the molten composition filling the body cavity is less than or equal to about 108 mm/s.

5. The method of any one of claims 1 to 4, wherein the flow velocity of the molten composition filling the at least one fine feature chamber is at least about 51 mm/s.
6. The method of any one of claims 1 to 5, wherein the at least one fine feature chamber has a minor feature dimension in the range of from about 100 nm up to and including about 20 microns.
7. The method of claim 2, wherein the difference between the first flow velocity and the second flow velocity is at least about 12.7 mm/s.
8. The method of any one of claims 1 to 7, wherein the mesogens of the TLCP solidified in the at least one fine feature chamber are molecularly aligned, relative to the flow direction of the moving molten composition filling the at least one fine feature chamber, by an anisotropy factor in the range of from greater than 0.4 up to 1.0.
9. A molded article comprising a body and at least one 3-dimensional structural feature integral with and protruding out from said body, said at least one structural feature comprising at least one fine feature element having a minor dimension, and said at least one structural feature comprising at least one thermotropic liquid crystalline polymer (TLCP) having a plurality of mesogens, with at least a portion of the mesogens across said minor dimension being in a flow aligned state.
10. The molded article of claim 9, wherein at least about 30% of the TLCP mesogens across the minor dimension of each fine feature element are flow aligned.
11. The molded article of claim 9 or 10, wherein the TLCP mesogens in each fine feature element exhibit an average anisotropy factor in the range of from at least about 0.3 up to and less than 1.0.
12. The molded article of any one of claims 9 to 11, wherein the flow aligned TLCP mesogens across the minor dimension of each fine feature element exhibit an average anisotropy factor in the range of from at least about 0.5 up to and less than 1.0.

13. The molded article of any one of claims 9 to 12, wherein at least about 10% of the TLCP mesogens in each structural feature are flow aligned, with the remainder of the TLCP mesogens in each structural feature having a relatively isotropic orientation state.
14. The molded article of any one of claims 9 to 13, wherein the minor dimension of said at least one fine feature element is less than or equal to about 500 μm .
15. The molded article of one of claims 9 to 13, wherein the minor dimension of said at least one fine feature element is in the range of from about 90 nm up to and including about 20 microns.

What is claimed is:

1. A method of molding an article, said method comprising:

providing a composition comprising at least one thermotropic liquid crystalline

5 polymer (TLCP), with the TLCP comprising a plurality of mesogens;

providing a mold comprising a mold cavity, with the mold cavity comprising at least one feature cavity, and each feature cavity comprising at least one fine feature chamber having a minor dimension up to 100 micrometers;

10 heating the composition so as to form molten composition comprising molten TLCP;

filling the mold cavity with a desired amount of the molten composition such that the molten composition filling the at least one fine feature chamber is moving at a flow velocity that causes flow alignment of at least a portion of the mesogens in the corresponding molten TLCP relative to a flow direction of the moving molten composition; and

15 solidifying the molten composition such that mesogens of at least the solidified TLCP in the at least one fine feature chamber substantially maintain their flow alignment.

20 2. The method of claim 1, wherein said mold cavity further comprises a body cavity, with each feature cavity extending from and being connected with the body cavity so as to allow molten composition to flow from the body cavity into each feature cavity, and said filling the mold cavity comprises:

25 filling the body cavity with a desired amount of the molten composition such that at least a portion of the molten composition filling the body cavity is moving at a first flow velocity that causes flow tumbling of mesogens in the corresponding molten TLCP,

wherein the flow velocity of the molten composition filling each fine feature chamber is a second flow velocity that is faster than the first flow velocity.

30 3. The method of claim 2, wherein the body cavity corresponds to a body portion of the article being molded.

4. The method of claim 2, wherein the first flow velocity of the molten composition filling the body cavity is less than or equal to about 108 mm/s.

5. The method of any one of claims 1 to 4, wherein the flow velocity of the molten composition filling the at least one fine feature chamber is at least about 51 mm/s.

6. The method of any one of claims 1 to 5, wherein the at least one fine feature chamber has a minor feature dimension in the range of from 100 nm up to and including 20 microns.

7. The method of claim 2, wherein the difference between the first flow velocity and the second flow velocity is at least about 12.7 mm/s.

8. The method of any one of claims 1 to 7, wherein the mesogens of the TLCP solidified in the at least one fine feature chamber are molecularly aligned, relative to the flow direction of the moving molten composition filling the at least one fine feature chamber, by an anisotropy factor in the range of from greater than 0.4 up to 1.0.

9. A molded article comprising a body and at least one 3-dimensional structural feature integral with and protruding out from said body, said at least one structural feature comprising at least one fine feature element having a minor dimension up to 100 micrometers, and said at least one structural feature comprising at least one thermotropic liquid crystalline polymer (TLCP) having a plurality of mesogens, with at least a portion of the mesogens across said minor dimension being in a flow aligned state.

10. The molded article of claim 9, wherein at least about 30% of the TLCP mesogens across the minor dimension of each fine feature element are flow aligned.

11. The molded article of claim 9 or 10, wherein the TLCP mesogens in each fine feature element exhibit an average anisotropy factor in the range of from at least about 0.3 up to and less than 1.0.

12. The molded article of any one of claims 9 to 11, wherein the flow aligned TLCP mesogens across the minor dimension of each fine feature element exhibit an average anisotropy factor in the range of from at least about 0.5 up to and less than 1.0.
- 5 13. The molded article of any one of claims 9 to 12, wherein at least about 10% of the TLCP mesogens in each structural feature are flow aligned, with the remainder of the TLCP mesogens in each structural feature having a relatively isotropic orientation state.
- 10 14. The molded article of one of claims 9 to 13, wherein the minor dimension of said at least one fine feature element is in the range of from 90 nm up to and including 20 microns.