CLAIMS

1. A method of fabricating a flexible adhesive product (12), comprising:

providing a flexible substrate (110) comprising a first adhesive layer (112);

at each of multiple respective segment locations on the flexible substrate (110), forming at least one device layer (122) comprising an antenna (84), a wireless communication system (72, 74), a processor (78, 90), an energy source (92, 116, 242, 252), and a respective wake circuit (275) comprising an input node (277) and configured to transition from an off-state to an on-state in response to a cut across the flexible adhesive product that creates an open circuit in an electrical path of the respective wake circuit (275) that pulls the voltage on the input node (277) above a threshold turn-on voltage and thereby closes an electrical path that couples the energy source (92, 116, 242, 252) to the processor (78, 90) and the wireless communication system (72); and

annealing the at least one device layer (122) between the flexible substrate (110) and a flexible cover (126) to form a flexible laminated structure.

2. A method according to Claim 1, in which, in each of multiple ones of the segments, the respective energy source (92, 116, 242, 252) comprises a flexible battery.

3. A method according to Claim 1, in which, in each of multiple ones of the segments, the respective energy source (92, 116, 242, 252) comprises a cylindrical single cell battery arranged in the device layer (122) between the flexible cover (126) and the flexible substrate (110).

4. A method according to Claim 1, further comprising planarizing the at least one device layer (122) with a flexible polymer.

5. A method according to Claim 4, in which the flexible polymer layer planarizes the device layer (122) with a substantially planar surface facing the flexible cover.

6. A method according to Claim 4, in which the flexible polymer layer comprises a flexible epoxy.

7. A method according to Claim 5, in which the planarizing comprises encapsulating the device layer (122) with the flexible polymer layer.

8. A method according to Claim 1, further comprising bonding peripheral portions of the flexible substrate (110) to corresponding peripheral portions of the flexible cover (126).

9. A method according to Claim 1, in which the forming comprises, at each of multiple respective segment locations, incorporating at least one sensor (94) operable to generate ambient data characterizing an environmental state of the segment, and a non-transitory processor readable medium configured with instructions which, when executed by the processor (78, 90), configures the processor (78, 90) to perform operations comprising processing the ambient data, storing the processed ambient data, and controlling the wireless communication system (72, 74) to transmit wireless messages comprising the processed ambient data to one or more network nodes.

10. A method according to Claim 9, further comprising, at each of multiple segment locations, providing a respective opening in the flexible cover to expose the sensor (94) to external ambient conditions.

11. A method according to Claim 10, further comprising configuring each respective sensor (94) to generate ambient data characterizing an environmental state of the segment in response to exposure to external ambient stimulus.

12. A method according to Claim 9, in which the sensor (94) is a GPS sensor.

13. A method according to Claim 9, in which the sensor (94) is one of a capacitive sensor, a pressure sensor, a humidity sensor, a light sensor, a sound sensor, an altimeter, a gyrator, an accelerometer, a temperature sensor, a flex sensor, and a strain sensor.

14. A method according to Claim 9, further comprising, in each of multiple ones of the segments, electrically connecting an output of a respective sensor (94) to an input of the respective wake circuit and, in response to a cut across the tracking flexible adhesive product, the respective wake circuit delivers power from the energy source (92, 116, 242, 252) to the respective processor (78, 90) and the respective wireless communications system in response to an output of the sensor (94).

15. A method according to Claim 14, in which, in each of multiple ones of the segments, the respective sensor (94) is a strain sensor that produces a wake signal based on a change in strain in the respective segment.

16. A method according to Claim 14, in which, in each of multiple ones of the segments, the respective sensor (94) is a capacitive sensor that produces a wake signal based on a change in capacitance in the respective segment.

17. A method according to Claim 14, in which, in each of multiple ones of the segments, the respective sensor (94) is a near-field communications sensor that produces a wake signal based on a change in inductance in the respective segment.

18. A method according to Claim 1, further comprising producing visible demarcations of the respective sections of the flexible adhesive product (12).

19. A method according to Claim 1, further comprising fabricating the adhesive product (12) as a tape comprising the segments, and winding the tape onto a roll.

20. A method according to Claim 1, further comprising fabricating the adhesive product (12) as a planar backing sheet comprising the segments.

21. A method of fabricating an adhesive product (12), comprising:

providing a flexible tape substrate (110) comprising a first adhesive layer (112);

at each of multiple respective segment locations along the flexible tape substrate (110), forming at least one device layer (122) comprising an antenna (84), a wireless communication system (72, 74), a sensor (94) operable to generate ambient data characterizing an environmental state of the segment, a processor (78, 90), an energy source (92, 116, 242, 252), at least one non-transitory processor (78)-readable medium comprising instructions which, when executed by the processor (78), configures the processor (78, 90) to perform operations comprising processing the ambient data, storing the processed ambient data, and controlling the wireless communication system (72, 74) to transmit wireless messages comprising the processed ambient data to one or more network nodes, and at least one respective flexible circuit (120) electrically connecting the wireless communication system (72, 74) to the antenna (84), the processor (78, 90) to the wireless communication system (72, 74) and the sensor (94), and the energy source (92, 116, 242, 252) to the processor (78, 90), the sensor (94), and the wireless communication system (72, 74); and

annealing the at least one device layer (122) between the flexible tape substrate (110) and a flexible tape cover (126) to form a flexible laminated structure.

CLAIMS

1. A method of fabricating a flexible adhesive product (12), comprising:

providing a flexible substrate (110) comprising a first adhesive layer (112);

at each of multiple respective segment locations on the flexible substrate (110), forming at least one device layer (122) comprising an antenna (84), a wireless communication system (72, 74), a processor (78, 90), an energy source (92, 116, 242, 252), and a respective wake circuit (275) comprising an input node (277) and configured to transition from an off-state to an on-state in response to a cut across the flexible adhesive product that creates an open circuit in an electrical path of the respective wake circuit (275) that pulls the voltage on the input node (277) above a threshold turn-on voltage and thereby closes an electrical path that couples the energy source (92, 116, 242, 252) to the processor (78, 90) and the wireless communication system (72); and

annealing the at least one device layer (122) between the flexible substrate (110) and a flexible cover (126) to form a flexible laminated structure.

2. A method according to Claim 1, in which, in each of multiple ones of the segments, the respective energy source (92, 116, 242, 252) comprises a flexible battery.

3. A method according to Claim 1, in which, in each of multiple ones of the segments, the respective energy source (92, 116, 242, 252) comprises a cylindrical single cell battery arranged in the device layer (122) between the flexible cover (126) and the flexible substrate (110).

4. A method according to Claim 1, further comprising planarizing the at least one device layer (122) with a flexible polymer.

5. A method according to Claim 4, in which the flexible polymer layer planarizes the device layer (122) with a substantially planar surface facing the flexible cover.

6. A method according to Claim 4, in which the flexible polymer layer comprises a flexible epoxy.

7. A method according to Claim 5, in which the planarizing comprises encapsulating the device layer (122) with the flexible polymer layer.

8. A method according to Claim 1, further comprising bonding peripheral portions of the flexible substrate (110) to corresponding peripheral portions of the flexible cover (126).

9. A method according to Claim 1, in which the forming comprises, at each of multiple respective segment locations, incorporating at least one sensor (94) operable to generate ambient data characterizing an environmental state of the segment, and a non-transitory processor readable medium configured with instructions which, when executed by the processor (78, 90), configures the processor (78, 90) to perform operations comprising processing the ambient data, storing the processed ambient data, and controlling the wireless communication system (72, 74) to transmit wireless messages comprising the processed ambient data to one or more network nodes.

10. A method according to Claim 9, further comprising, at each of multiple segment locations, providing a respective opening in the flexible cover to expose the sensor (94) to external ambient conditions.

11. A method according to Claim 10, further comprising configuring each respective sensor (94) to generate ambient data characterizing an environmental state of the segment in response to exposure to external ambient stimulus.

12. A method according to Claim 9, in which the sensor (94) is a GPS sensor.

13. A method according to Claim 9, in which the sensor (94) is one of a capacitive sensor, a pressure sensor, a humidity sensor, a light sensor, a sound sensor, an altimeter, a gyrator, an accelerometer, a temperature sensor, a flex sensor, and a strain sensor.

14. A method according to Claim 9, further comprising, in each of multiple ones of the segments, electrically connecting an output of a respective sensor (94) to an input of the respective wake circuit and, in response to a cut across the tracking flexible adhesive product, the respective wake circuit delivers power from the energy source (92, 116, 242, 252) to the respective processor (78, 90) and the respective wireless communications system in response to an output of the sensor (94).

15. A method according to Claim 14, in which, in each of multiple ones of the segments, the respective sensor (94) is a strain sensor that produces a wake signal based on a change in strain in the respective segment.

16. A method according to Claim 14, in which, in each of multiple ones of the segments, the respective sensor (94) is a capacitive sensor that produces a wake signal based on a change in capacitance in the respective segment.

17. A method according to Claim 14, in which, in each of multiple ones of the segments, the respective sensor (94) is a near-field communications sensor that produces a wake signal based on a change in inductance in the respective segment.

18. A method according to Claim 1, further comprising producing visible demarcations of the respective sections of the flexible adhesive product (12).

19. A method according to Claim 1, further comprising fabricating the adhesive product (12) as a tape comprising the segments, and winding the tape onto a roll.

20. A method according to Claim 1, further comprising fabricating the adhesive product (12) as a planar backing sheet comprising the segments.

21. A method of fabricating an adhesive product (12), comprising:

providing a flexible tape substrate (110) comprising a first adhesive layer (112);

at each of multiple respective segment locations along the flexible tape substrate (110), forming at least one device layer (122) comprising an antenna (84), a wireless communication system (72, 74), a sensor (94) operable to generate ambient data characterizing an environmental state of the segment, a processor (78, 90), an energy source (92, 116, 242, 252), at least one non-transitory processor (78)-readable medium comprising instructions which, when executed by the processor (78), configures the processor (78, 90) to perform operations comprising processing the ambient data, storing the processed ambient data, and controlling the wireless communication system (72, 74) to transmit wireless messages comprising the processed ambient data to one or more network nodes, and at least one respective flexible circuit (120) electrically connecting the wireless communication system (72, 74) to the antenna (84), the processor (78, 90) to the wireless communication system (72, 74) and the sensor (94), and the energy source (92, 116, 242, 252) to the processor (78, 90), the sensor (94), and the wireless communication system (72, 74);

the at least one device layer (122) comprising a respective wake circuit (275) comprising an input node (277) and configured to transition from an off-state to an on-

state in response to a cut across the flexible adhesive product that creates an open circuit in an electrical path of the respective wake circuit (275) that pulls the voltage on the input node (277) above a threshold turn-on voltage and thereby closes an electrical path that couples the energy source (92) to the processor (90) and the wireless communication system (72); and

annealing the at least one device layer (122) between the flexible tape substrate (110) and a flexible tape cover (126) to form a flexible laminated structure.