

## CLAIMS

1. A semiconductor device comprising an array of containment cells, wherein each containment cell is configured to contain a medicament and each containment cell comprises a cell activation element configured to release the medicament within the containment cell upon receipt of an activation trigger.  
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2. The semiconductor device of claim 1, comprising control circuitry configured to activate the containment cells at predetermined times.  
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3. The semiconductor device of claim 2, wherein the control circuitry comprises an oscillator, a counter and a multiplexer, wherein the oscillator is configured to increment the counter, the counter is configured to output a count to the multiplexer, and the multiplexer is configured to decode the count to an address of a said  
15 containment cell.
4. The semiconductor device of claim 2 or 3, comprising interconnection circuitry configured to route the activation trigger to a said containment cell selected by the control circuitry.  
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5. The semiconductor device of claim 4, wherein the interconnection circuitry comprises a plurality of word lines and bit lines defining an addressable connection to the cell activation element of each containment cell.
- 25 6. The semiconductor device of claim 4, wherein the interconnection circuitry comprises a unique output line for the cell activation element of each containment cell.
7. The semiconductor device of any of claims 2-6, wherein the control circuitry is operable to configure the interconnection circuitry to route the activation trigger to the  
30 said selected containment cell.

8. The semiconductor device of any preceding claim, wherein each cell activation element comprises a fusible covering configured to contain the medicament within the cell and to release the medicament when fused.

5 9. The semiconductor device of claim 8, wherein each fusible covering forms a hermetic seal over or around the respective containment cell.

10. The semiconductor device of claim 8 or 9, wherein each fusible covering comprises a biocompatible conductor.

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11. The semiconductor device of any claims 8-10 when dependent on any of claims 2-7, comprising fusing circuitry configured to pass a fusing current through the fusible covering of a said containment cell selected by the control circuitry, the fusing current defining the activation trigger.

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12. The semiconductor device of claim 11, wherein the control circuitry is configured to switch on the fusing current at the predetermined times.

13. The semiconductor device of claim 11, wherein the fusing circuitry is  
20 configured to accumulate charge and to form the fusing current after a charging interval, the charging interval thereby defining the predetermined times.

14. The semiconductor device of any of claims 11-13 when dependent upon any of claims 4-6, wherein the interconnection circuitry is configured to route the fusing  
25 current from the fusing circuitry to the fusible covering of the said selected containment cell.

15. The semiconductor device of any of claims 11-14, comprising timing circuitry configured to switch off the fusing current after a predetermined period.

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16. The semiconductor device of any preceding claim, wherein each containment cell comprises a dissolvable layer containing the medicament within the containment cell, and wherein the cell activation element is configured to form a hermetic seal over

the dissolvable layer, and to expose the dissolvable layer to the surrounding environment upon receipt of the activation trigger.

17. The semiconductor device of any preceding claim, comprising engagement circuitry configured to enable the semiconductor device upon the detection of one or more predetermined conditions.

18. A punctal plug comprising the semiconductor device of any preceding claim.

19. A punctal plug configured to release discrete doses of medicament at predetermined times.

20. A punctal plug comprising control circuitry configured to activate one or more containment cells in an array to release medicament contained within the containment cells at predetermined times.

21. A punctal plug comprising interconnection circuitry configured to route an activation trigger to one or more selected containment cells in an array to release medicament contained within the containment cells at predetermined times.

22. A punctal plug comprising:  
a punctal plug body with a cavity within;  
an energizing device;  
an engagement element to activate the connection of the energizing device to the circuits within the punctal plug;  
a timing element to count for a predetermined time period;  
a multiplexer to decode the timing count into a designated containment cell;  
and  
a containment array wherein the individual elements are covered by a thin hermetic sealing film.

23. The punctal plug of any of claims 19-22, comprising the semiconductor device of any of claims 1-17.

24. A method of manufacturing a semiconductor device, the method comprising providing an array of containment cells, wherein each containment cell is configured to contain a medicament and each containment cell comprises a cell activation element
- 5 configured to release the medicament within the containment cell upon receipt of an activation trigger.

## CLAIMS

1. A punctal plug (100) comprising a semiconductor device (180); the semiconductor device comprising:
  - 5 an array of containment cells (190), wherein each containment cell is configured to contain a medicament and each containment cell comprises a cell activation element configured to release the medicament within the containment cell upon receipt of an activation trigger; and control circuitry configured to activate the containment cells at predetermined
  - 10 times.
2. The punctal plug of claim 1, wherein the control circuitry comprises an oscillator, a counter and a multiplexer, wherein the oscillator is configured to increment the counter, the counter is configured to output a count to the multiplexer,
- 15 and the multiplexer is configured to decode the count to an address of a said containment cell.
3. The punctal plug of claim 1 or 2, wherein the semiconductor device comprising interconnection circuitry configured to route the activation trigger to a said
- 20 containment cell selected by the control circuitry.
4. The punctal plug of claim 3, wherein the interconnection circuitry comprises a plurality of word lines and bit lines defining an addressable connection to the cell activation element of each containment cell.
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5. The punctal plug of claim 3, wherein the interconnection circuitry comprises a unique output line for the cell activation element of each containment cell.
6. The punctal plug of any of claims 1-5, wherein the control circuitry is operable
- 30 to configure the interconnection circuitry to route the activation trigger to the said selected containment cell.

7. The punctal plug of any preceding claim, wherein each cell activation element comprises a fusible covering configured to contain the medicament within the cell and to release the medicament when fused.
- 5 8. The punctal plug of claim 7, wherein each fusible covering forms a hermetic seal over or around the respective containment cell.
9. The punctal plug of claim 7 or 8, wherein each fusible covering comprises a biocompatible conductor.
- 10 10. The punctal plug of any claims 7-9 when dependent on any of claims 1-6, comprising fusing circuitry configured to pass a fusing current through the fusible covering of a said containment cell selected by the control circuitry, the fusing current defining the activation trigger.
- 15 11. The punctal plug of claim 10, wherein the control circuitry is configured to switch on the fusing current at the predetermined times.
- 20 12. The punctal plug of claim 10, wherein the fusing circuitry is configured to accumulate charge and to form the fusing current after a charging interval, the charging interval thereby defining the predetermined times.
- 25 13. The punctal plug of any of claims 10-12 when dependent upon any of claims 4-6, wherein the interconnection circuitry is configured to route the fusing current from the fusing circuitry to the fusible covering of the said selected containment cell.
- 30 14. The punctal plug of any of claims 10-13, wherein the semiconductor device comprising timing circuitry configured to switch off the fusing current after a predetermined period.
15. The punctal plug of any preceding claim, wherein each containment cell comprises a dissolvable layer containing the medicament within the containment cell, and wherein the cell activation element is configured to form a hermetic seal over the

dissolvable layer, and to expose the dissolvable layer to the surrounding environment upon receipt of the activation trigger.

16. The punctal plug of any preceding claim, wherein the semiconductor device  
5 comprising engagement circuitry configured to enable the semiconductor device upon the detection of one or more predetermined conditions.

17. The punctal plug of claim 1 comprising:  
a punctal plug body with a cavity within;  
10 an energizing device and;  
an engagement element to activate a connection of the energizing device to the control circuitry within the punctal plug;  
wherein the control circuitry comprising:  
a timing element to count for a predetermined time period; and  
15 a multiplexer to decode the timing count into a designated containment cell;  
wherein the individual elements of the array of containment cells are covered by a thin hermetic sealing film.