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ABSTRACT

A data storage and processing apparatus comprises ROM and/or WORM and/or REWRITEABLE memory modules and data processing modules is provided on a substrate. A memory and processing module are provided in a single main layer or multiple stacked main layers on the top of the substrate and the memory modules and the data processing module in each main layer communicate through vias, surface or edge connections with other main layers or circuitry provided on or in the substrate. Further the apparatus comprises active circuits, transistors and/or diodes for operating the apparatus. Each main layer of a memory module and/or data processing module comprises a stack of functional sublayers, each functional sublayer realizing one or more specific circuit functions. At least some of the active circuitry is provided in the main layer of main layers and at least some of the functional layers comprise a combination of low temperature-compatible film materials and low temperature-compatible processed inorganic thin films.

In a method for fabricating an apparatus of this kind, the main layers and the functional sublayers thereof are deposited and processed under thermal conditions that avoids subjecting an already deposited and processed underlying layer or layers to a temperature exceeding a specified temperature value or to processed-induced chemical damage. Particularly transient heating with pulse laser or particle beams is used for processing the inorganic semiconductor materials. Additional organic materials for the layers are deposited with processes commonly used in organic thin-film technology.



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