

Solid state combinatorial chemistry and material technology

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The increasing complexity and precision in functional materials motivated us to develop innovative new technology for screening new composition, nano scaling of surface and interfaces, and process parameters in much shorter time than by the traditional one-by-one approach. Combinatorial technology employs methodologies for the parallel production of a group of systematically designed materials, for example, in the form of thin film library mounted on a single substrate. We have designed and developed new systems for parallel fabrication of composition and/or condition modulated thin film libraries. By installing special equipments to monitor and control each film deposition process on an atomic scale, a group of nano-structured films, dots, and wires can be integrated into a three-dimensionally parameterized materials chip. Topics include the concept, instrumentation, and fruits of combinatorial solid state material synthesis and characterization.

Ref. [1] H. Koinuma and I. Takeuchi, Nature Materials, 3, 429 (2004)