High Throughput Synthesis and Screening of Chalcogenide Materials for Data Storage

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The ability to store information through the phase change mechanism is a well established technology for optical data storage, with typically germanium antimony telluride based films forming the active layer of a phase change disc. However, the ever increasing need for greater storage densities, shorter write/erase duration and longer archival time is driving interest beyond these established materials. A new thin high throughput thin film deposition method provides a well controlled route to the synthesis of a wide range of chalcogenide compositions through simultaneous deposition of the component elements. When combined with fast primary and secondary screening techniques, the amorphous / crystalline phase transition can be characterised across the ternary compositional space. When combined with a full high throughput characterisation of the phases using EDX and XRD, conductivity measurements and ellipsometric characterisation of the optical properties, a better understanding of the desired phenomena for phase change memory applications is accessible. Results of a high throughput study of the GeSbTe system are presented.