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Preparation of GeTe chalcogenide solutions for thin film applications

Chalcogenide films have been intensively studied due to their versatile applications in the fields of electronic and photonic devices. Many methods of preparing chalcogenide films have been suggested: sputtering, evaporation, chemical vapor deposition, and vapor-liquid-solid growth. While the usual preparation method is to deposit chalcogenide film layers using sputtering, solution-based processes are considered as another promising method due to their simple and cost-effective nature. Spin coating is one of the most well-known solution-based processes, but this solution-based technique available for device fabrication is still rather limited, except for GeSbSe and GeSeTe films. Among chalcogenide materials, GeTe has drawn attention as an active material for the fabrication of phase change memory. It exhibits reversible switching between conductive crystalline and resistive amorphous states when heated and quenched respectively. In addition, Te-rich GeTe alloys have been investigated due to their potential applications in optical waveguides. Thus, we conducted dissolution experiments on bulk GeTe to develop spin-coated GeTe film layers for electronic and photonic applications. Different solvents such as KOH, n-Butylamine, and ammonium hydroxide were used to dissolve GeTe powders. Dissolution kinetics was examined by measuring the weight loss of GeTe powders in solvents. The dissolution rate was significantly different depending on the kinds of solvents, and agglomerate-free solutions were obtained by varying the weight ratio of GeTe to solvent and magnetic stirring time.

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