

Preparation of amorphous chalcogenide alloys by twin roller quenching and thermal co-evaporation

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Two techniques of material elaboration are described, that allow obtaining amorphous materials in larger composition domains and/or in larger quantities than those obtained by the regular melt/quenching technique or by the sputtering method usually used to prepare phase change materials.

The twin roller quenching (TRQ) technique is based upon laminating a molten droplet of the required composition between two rotating rollers. Obtained flakes are about 50-80 micron thick. The thermal co-evaporation (TCE) method allows depositing thick films (up to 14 microns) of ternary compounds by simultaneously evaporating the three elements from 3 independent sources. Tuning of the film composition is easily carried out by monitoring the temperatures of the sources.

Results obtained on binary Ge-Te and ternary Ge-Ga-Te are shown and discussed. X-ray diffraction allowed identifying the amorphous state or crystalline phases present in the samples. Electron Probe Micro-Analysis was used to check the composition of the materials. Thermal properties for Ge-Te compounds either prepared by TRQ or TCE were investigated by differential scanning calorimetry. It showed a similar behavior for both samples.