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Germanium-based nanostructure synthesis guided by amphiphilic diblock copolymer templating

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Latest research in the field of hybrid photovoltaics focuses on the benefits of inorganic and organic materials. Flexibility, low cost and large-scale production are the most valuable properties of organic components whereas the inorganic components add chemical and physical stability. So far thin films based on titanium dioxide are well investigated, whereas less is known about germanium-based compounds. In this work, we analyze thin films with optical, electrical and morphological measurement techniques to understand and control the corresponding properties. An amphiphilic diblock copolymer templating with polystyrene-b-polyethylene oxide (PS-b-PEO) and a metal-semiconductor precursor are used to prepare thin films via sol-gel synthesis. The copolymer templating results in nanoporous foam-like germanium-based thin films. In the present study, different molar concentrations of germanium-based compounds are prepared and analyzed. As the major technique for real-space imaging in this research field, SEM can only provide information about the surface. Therefore grazing incidence X-ray scattering (GIXS) and grazing incidence neutron scattering (GINS) are used to get further data about the formation of the inner structure in the nanoscale regime.

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