Polymeric Tin Carbide Synthetized by Matrix Assisted Pulsed Laser Evaporation.

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Technological progress in electronics, photovoltaics, automotive industry etc. drives a need for novel materials. Various polymers, synthetic metals, aerogels, graphene, MAX phases etc. witness this trend worldwide.

Carbides are a large group of compounds between carbon and various elements. In IV group of Mendeleev`s table (C, Si, Ge, Sn, Pb) only a single carbide has been known – silicon carbide. In case of other elements, it is believed that crystalline carbide do not exist due to a large difference between carbon and tin (germanium) atomic radii. However, amorphous germanium carbide has been prepared yet. Moreover, some theoretical works indicate that crystalline carbides of Sn and Ge could exist [1].

Polymeric SnCx films were synthetized by MAPLE technique (Matrix Assisted Pulsed Laser Evaporation). Organotin precursors tetravinyltin $Sn(CH{=}CH_2)_4$ and/or hexamethylditin $Sn_2(CH_3)_6$ with a solvent were frozen and subsequently as a target irradiated by TEA CO_2 laser and evaporated. Double bonds caused polymerization due to both irradiation and heating of substrates (up to 250 °C). As the films are extremely sensitive towards ambient (oxygen, water), they were immediately analyzed by XP spectroscopy after synthesis. Raman and UV-Vis spectroscopies have shown that carbon is not graphitized and only sp^3 form is present.

Reference

[1] X. Zhang, S. Quan, C. Ying, Z. Li, *Solid State Communications*, **151**, 1545–1549 (2011)

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