CVD-Grown Tin Sulphide Thin Films for Photovoltaic Applications

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Abstract:
The search for new materials suitable for photovoltaic (PV) devices needs to satisfy many requirements such as the ability to synthesize by a wide range of methods for mass production using non vacuum and simple techniques. Tin sulfide is being widely investigated as a material that can be utilized in PV devices. However, conversion efficiency of SnS devices is still low, a theoretical efficiency of 32% and an experimental efficiency of 4.36% [1], [2]. This poor performance may be related to several issues such as device architecture, low quality of material and other [3]. Amorphous phase Sn-S thin films were fabricated by APCVD at room temperature using $SnCl_4$ precursor to react with H_2S gas. Phase Engineering of Sn-S thin films were investigated by annealing these films in a range of temperatures with controlled atmosphere. We address the second issue in this study investigating the effect of annealing temperatures on the stoichiometry and phases of the SnS thin films by a series of characterizations including SEM, EDX, Raman, XRD and UV-VIS-NIR. A scalable and controllable Sn-S phase engineering have been demonstrated and the results are very promising for PV applications.

References:
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