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Surface chemistry and interface reactions of chalcogenide semiconductors deposited by solution-based methods for solar cell applications

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The ability to produce stoichiometric semiconducting films by solution-based methods is of paramount importance for large area electronics and solar cell applications. In addition, low temperature processing on large areasubstrates promises to drive down costs. Chalcogenide materials offer p- and n-type semiconductors with attractive characteristics for electronic and photovoltaic applications. Necessary operations for device fabrication requires an atomistic understanding of the structure and chemical reactions taking place during thin film deposition and post-deposition thermal treatments. In this respect, X-ray photoelectron spectroscopy (XPS) is uniquely suited for tracking chemical reactions occurringsurface and interface of nanometric layers. The chemical analysis and thermal stability for surface and interface reactions of binary chalcogenide semiconductors is presented. CuS, ZnS, SnS2 and CdS thin films were deposited by the successive ionic layer absorption and reaction method (SILAR) in a glove-box attached to the XPS load-lock chamber for in-situ analyses. Step by step XPS analysis of the SILAR process reveals an incubation period that depends on temperature and ion concentrations. Multilayer structure stability is discussed in terms of chemical reactivity and diffusion of cations. Finally, a demonstration of how theobtained results can help to engineer a more stable structureis presented.

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Decontamination of toxic metals from waste water using modified biomaterial

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Heavy metals are important member of dirty dozen club of pollutants encountered in waste water. The aforesaid methods have major disadvantages such as high energy requirements, incomplete metal removal and large quantity of toxic waste sludge that needs again safest disposal. In recent perspectives, biomaterials have gained much importance for decontamination of water. Bioremediation involves the reduction of overall treatment cost through the application of agricultural residues which are particularly attractive as they lessen reliance on imported water treatment chemicals, negligible transportation requirements and capacity of reuse involving "implementation of local environmental tactics to solve local environmental issues". However, biomaterials have also been associated with drawbacks related to stability and less sorption of wide range of toxic metals, restricting their commercial use. Therefore, biosynthetic modifications to improve the binding capacity, selectivity and stability of natural biomaterials have attracted the keen attention of scientific community. With this aim in view, the present piece of work highlighted the efficacy of Ficus religiosa leaf powder [FRLP] in the abatement of abatement of Pb (II) and Cr (VI) in single metal solution. Synthetic strategy for strengthening the functional groups [COO^-] responsible for binding of metal species has been applied using acetylation, succination, graft co-polymerization and impregnation of layer processes. Resulted novel biomaterial exhibits enhancement in sorption efficiency [2-15%] and stability in terms of regeneration cycles. Evidences in support of biomaterial designed have been provided on the basis of SEM, FTIR and TGA. Resulting information can be utilized as less expensive, environment friendly method with enhanced sorption efficacy and environmental stability for removal of toxic metal from contaminated water particularly for the rural and remote areas of the Country.

Biography

Pritee Goyal has completed her PhD from Dayalbagh University, Agra and doing postdoctoral studies from Delhi University, Delhi. She has published 12 papers in reputed journals and wrote 1 book & 2 chapters published by Taylor & Francis. She also filed 2patents and got best paper award in Conference.

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