INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI
SHORT ABSTRACT OF THESIS

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SHORT ABSTRACT

The work presented in this thesis revolves around the utilization of several photoanodic architectures to improve the performance of 3rd generation photovoltaic systems i.e., dye-/quantum dots sensitized solar cells. Several efforts have been made to enhance the solar light harvesting efficiency of sensitized solar cells, exploring the different morphologies of metal oxide and sensitizer materials. Naturally occurring biomass derived templating agents are used for tuning the morphologies of metal oxide. Due to anisotropic growth behavior and ease in crystallization process, zinc oxide (ZnO) has been utilized as model system in the present thesis and developed various morphologies such as one- (1-D), two-dimensional (2-D) and three-dimensional (3-D) nanoarchitechtures. All these morphological features of ZnO are endowed with unique physical, optical and electrical properties such as, specific surface area, scattering of light, charge transport etc. We have fabricated the photoanodes using these morphologies, sensitized with different light absorbing materials; organic dyes and semiconductor metal sulfides to improve the efficiency of photovoltaic devices. Chemiresistor devices based on different morphologies of metal oxide are also fabricated for highly selective and ultrasensitive NH_3 vapors sensing application. Significant observations and improvements related to fabrication of hybrid photoanodes have been achieved during my PhD work.