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Name of the Scholar : Syed Asim Ali

Name of the Supervisor : Prof. Tokeer Ahmad

Name of the Department/Centre : Chemistry

Topic of Research: Synthesis, Characterization and Applications of Molybdenum Chalcogenide based Nano-sized Heterostructures

Findings

The work of my Ph. D thesis has been based on designing nanostructured heterostructured catalysts for multifunctional applications, focusing mainly on synthesis and applications of molybdenum chalcogenides and their heterostructures for hydrogen evolution and gas sensing applications. The complete work of my doctoral thesis is divided into eight chapters in which Chapter 1 is introduction which gives the brief overview of the catalysis and properties of nanostructures materials as catalysts. The remaining seven chapters were experimental ones focusing on different metal-oxides with varied organic conversions. Chapter 2 deals with photo/electro/photoelectrochemical hydrogen generation applications of $\text{MoO}_3\text{-SrTiO}_3$ nanocatalysts. Chapter 3 deals with heterogeneous catalytic applications of $\text{TiO}_2\text{-MoO}_3$ heterojunctions. Chapter 4 discusses catalytic applications of $\text{MoS}_2\text{-BN/TiO}_2$ heterostructures for green hydrogen production. Chapter 5 deals with $\text{MoSe}_2\text{-BN/TiO}_2$ nanocatalysts and their catalytic applications in hydrogen evolution reaction (HER). Chapter 6 deals with $\text{MoSe}_2\text{-MoS}_2\text{/TiO}_2$ heterostructures and their HER applications. Chapter 7 examines the quaternary $\text{Te-MoTe}_2\text{-MoS}_2\text{/ZnO}$ heterostructures and their catalytic applications for overall water splitting. Chapter 8 deals with the fabrication of quaternary $\text{Te-MoTe}_2\text{-MoSe}_2\text{/ZnO}$ heterojunctions and their catalytic efficiency for hydrogen and oxygen evolution reactions.