

Design and Functionalization of Conducting Polymers for Advanced Sensing, Electrochromic, and Energy Applications

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Abstract:

Conducting polymers have emerged as versatile materials for a wide range of technological applications owing to their tunable electronic, optical, and electrochemical properties. This seminar will present our recent research efforts on the molecular design of novel monomers and the development of functional conducting polymer systems with enhanced performance. Particular emphasis will be given to structure–property relationships governing electrochemical activity, conductivity, and stability. Applications in electrochromic devices, metal ion sensing, biosensing platforms, and energy-related technologies will be discussed. In addition, the integration of photoresponsive azobenzene moieties into conducting polymer architectures will be highlighted, demonstrating how light-induced molecular switching can be utilized to tailor material properties and improve device functionality. These studies provide new insights into the design of multifunctional conducting polymer materials for next-generation smart technologies.