

Advanced Functional Materials for Environmental Protection and Electrochemical Sensing

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Abstract: Advanced functional materials play a crucial role in addressing contemporary challenges in environmental protection, energy conversion, and chemical sensing. This presentation highlights recent advances in the synthesis and engineering of zeolite-based materials for environmental applications. Owing to their high surface area and tunable porous structure, zeolites are highly effective for adsorption, catalysis, and pollutant removal from water systems.

In parallel, the fabrication of modified electrodes incorporating these materials represents a promising strategy for the sensitive detection and quantification of pollutants based on their electrochemical behavior. The integration of porous frameworks with conductive substrates enables efficient electrochemical sensing of heavy metals and organic contaminants. Emphasis is placed on scalable synthesis routes, structure–property relationships, and practical environmental applications, contributing to the development of sustainable technologies for environmental monitoring and protection.

Keywords: Functional materials; chemical sensing; pollutants; electrochemical sensing.