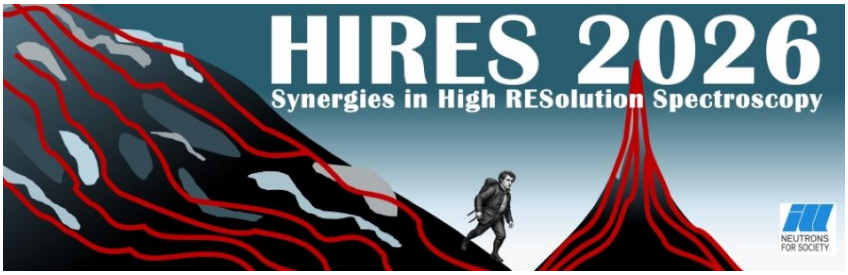

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Neutron Scattering Opportunities in Hierarchical Graphene–Zeolite Hybrid Materials for Dye Adsorption

Hierarchical graphene–zeolite hybrid materials (MZN–GO and MGN) combine ~5 nm mesopores, sub-1.5 nm micropores, and heterogeneous carbon–zeolite interfaces containing –OH/–COOH groups, mixed sp^2/sp^3 domains, and defect-induced radical sites. These structural motifs strongly influence how confined water and organic dyes—here represented by Rhodamine 6G (R6G)—are adsorbed, organized, and transported within the pore network. Our preliminary BET, electron microscopy, and Raman/SERS studies reveal distinct confinement effects and interfacial interactions that cannot be captured by X-ray or optical probes alone.

Although neutron experiments have not yet been undertaken, this system offers compelling opportunities for QENS and contrast-matched SANS. Neutrons could directly resolve confined-water mobility, hydrogen-related dynamics, dye aggregation states, and pore-filling behavior—key parameters for understanding adsorption efficiency and guiding rational materials design.

We are actively seeking neutron-scattering collaborators interested in advancing the structure–dynamics relationships governing pollutant uptake in hybrid porous materials. Our team will provide well-defined materials and comprehensive physicochemical characterization. We welcome joint efforts to develop future neutron proposals that leverage the complementary sensitivities of QENS and SANS to advance materials science in confined environments.

Session

Materials Science

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