

Towards Sustainable Energy and Materials: Carbon Capture and Conversion using Novel Liquid-like Nanoscale Hybrid Particulate Systems

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Nanoparticle Organic Hybrid Materials (NOHMs) are a new class of organic-inorganic hybrids that consist of a hard nanoparticle core functionalized with a molecular organic corona that possesses a high degree of chemical and physical tunability. NOHMs are liquid-like, non-volatile and stable over a very wide temperature range, which make them interesting materials for various energy and environmental applications. While their CO₂ capture efficiency and selectivity are great, like other anhydrous CO₂ capture solvents, NOHMs suffer from high viscosity. Thus, an innovative encapsulation system has been developed to create large gas-liquid interfaces for CO₂ capture using these viscous solvents and encapsulated solvents show greatly improved CO₂ capture rates. The development of these unique particulate systems will not only advance CO₂ capture materials design but also introduce unique particle technology research opportunities in various fields.