

Closing the Carbon Cycle for Sustainable Energy and Environment: CO₂ Capture using Novel Platform Materials & CO₂ Sequestration with Integrated Energy Recovery

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Sustainability has become an urgent global issue with the exhaustion of fossil fuel and the climate debate. Thus, developments in alternative energy sources and capturing & storing carbon dioxide have been the focus of recent research in the energy and environment field. My research has specifically focused on two distinct engineered and natural materials: i) the synthesis of organic-inorganic platform materials for efficient CO₂ capture and ii) the combined energy recovery and CO₂ sequestration in complex structured naturally-occurring methane hydrate. This research aims to close the carbon cycle by extracting maximum energy possible from the new natural resources while efficiently storing excess waste carbon in natural systems. The findings from these studies will provide valuable fundamental knowledge for the environmental field and energy sustainability.