

Functional Hybrid Platforms: Chemical Engineering Perspectives

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Lessons from Nature demonstrate that nanomaterials with different dimension and size, such as nanoparticles, nanowires, and nanosheets, are intricately assembled to reveal unique multiscale structure and functions. The first step to bring to fruition such distinctive structure and properties is the rational design of various functional materials for hybridization such as self-assembling organic materials and functional inorganic nanomaterials. Next step would be the modification of such component nanomaterials to impart the stability of component materials as well as to integrate themselves into hybridized hierarchical structures. Our current interests in the CRI center are centered on suggesting new paradigms for intelligent hybrid materials such that all the unique functions are programmed within the hybrid materials based multifaceted approaches such as the efficient synthesis of functional nanomaterials with different dimension and size, the organic/inorganic hybridization, and the directed assembly process to realize complex hierarchical structure, mimicking the Nature. These intelligent hybrid materials platforms would significantly contribute to solve critical issues in science and technology in modern era such as nanomedicine, energy, and environment.