

Building Functional Materials via Directed Self-assembly

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Controlled assembly of functional building blocks over multiple length scales has great potential to advance technologies and will impact human health, renewable energy and environment. However, generating hierarchically structured materials in a manner similar to that seen in nature represents a fundamental scientific challenge. I will discuss some recent advances in directed self-assemblies of various building blocks including peptides and proteins, nanoparticles, organic semiconductors and polymers. These efforts can lead to functional materials with features down to the molecular level and contain inherent biological, electronic and optical properties for energy harvesting and storage and life sciences. Equally important, we focus our efforts on achieving this using secondary interactions to ensure long-term sustainability.