Solution-Processed Fabrication of Multi-functional Thin-Films Using Colloidal Nanocrystal Inks

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Colloidal nanocrystals are widely used in various applications such as electronic devices, phosphors, and catalysts. The synthesis of highly uniform nanomaterials with controlled size, shape, and compositions is paramount to precise understanding their size- and shape-dependent properties as well as to arrange them into highly ordered arrays to design multi-functional metamaterials with novel collective behaviors. Here, I will describe novel meterials chemistry to synthesize colloidal nanocrystals with precise control of size, shape, and compositions and integrate them into functional thin-films using solution-based fabrication technique. In addition, I wiil also introduce the self-assembly of colloidal anisotropic nanocrystal building blocks with controlled orientation and spatial distribution, which may allow the design of novel multi-functional thin-films with unique shape- and orientation-dependent collective properties.