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Layer-by-layer fabrication of supramolecular dyes on TiO_2 surfaces for optoelectronic applications XIAOQING KONG, SHAWN MAGUIRE, Stevens Institute of Technology, DIANE LYE, MARCUS WECK, New York University, STEPHANIE LEE, Stevens Institute of Technology — We present a modular layer-by-layer approach based on metal coordination chemistry to assemble supramolecular dyes exhibiting increased absorption in the visible range on electrode surfaces. Specifically, palladiated bis-pincer complexes (Pd-BPCs) were employed as linkers between pyridyl-terminated organic molecules via dative bonding. By alternately immersing mesoporous TiO_2-coated glass substrates in solutions containing dissolved zinc porphyin (ZnP) and Pd-BPCs, supramolecular dyes were assembled layer-by-layer on the TiO_2 surfaces. UV-visible absorption spectra of these assembled structures revealed a linear increase in the Soret and Q bands of ZnP after each immersion of the substrate in the ZnP solution. Coordination of the ZnP layers with Pd-BPC resulted in a slight red shift (<10 nm) of the absorption bands. The modular nature of the assembly process afforded the incorporation of other pyridyl-terminated organic molecules in specific layers of the supramolecular assemblies. By assembling unique organic dyes that absorb different wavelengths of light, we expect to expand light absorption across the visible region of the solar spectrum for solar cell applications.

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