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Bio-inspired Structural Colors from Deposition of Synthetic Melanin Nanoparticles by Evaporative Self-assembly[1] MING XIAO, Univ of Akron, YIWEN LI, University of California, San Diego, DIMITRI DEHEYN, Scripps Institution of Oceanography, University of California, San Diego,, XIUJUN YUE, NATHAN GIANNESCHI, University of California, San Diego, MATTHEW SHAWKEY, ALI DHINOJWALA, Univ of Akron — Melanin, a ubiquitous black or brown pigment in the animal kingdom, is a unique but poorly understood biomaterial. Many bird feathers contain melanosomes (melanin-containing organelles), which pack into ordered nanostructures, like multilayer or two-dimensional photonic crystal structures, to produce structural colors. To understand the optical properties of melanin and how melanosomes assemble into certain structures to produce colors, we prepared synthetic melanin (polydopamine) particles with variable sizes and aspect ratios. We have characterized the absorption and refractive index of the synthetic melanin particles. We have also shown that we can use an evaporative process to self-assemble melanin films with a wide range of colors. The colors obtained using this technique is modeled using a thin-film interference model and the optical properties of the synthetic melanin nanoparticles. Our results on self-assembly of synthetic melanin nanoparticles provide an explanation as why the use of melanosomes to produce colors is prevalent in the animal kingdom.

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