

## Non-iridescent Structural Colors Developed by Amorphous Array of Air Cavities

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In this work, we design photonic films containing amorphous array of air cavities to develop non-iridescent structural colors. When monodisperse silica particles are concentrated in photocurable monomer with dimethacrylate group, the particles form amorphous array with a short-range order rather than crystalline array with long-range order; this is caused by insufficient interparticle repulsion. Photonic structures are fabricated by film casting and photo-polymerization of the silica suspensions and subsequent removal of the silica particles; absorptive black chemicals are dissolved in the silica suspension prior to film casting to reduce the incoherent scattering. Unlike crystalline counterparts, amorphous arrays of air cavities exhibit angle-independent structural colors due to their isotropic nanostructures, thereby providing non-iridescent structural colors. Moreover, the photonic structures can be micropatterned by photolithographic technique, providing great potential in a wide range of coloration applications.