



Dynamic Infrared Optical Materials Made from Metal Oxide Nanocrystals

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Radiation is a major pathway for energy transfer, motivating the development of materials that can manage heating, cooling, and daylighting via their dynamic optical response. Coatings based on metal oxide nanocrystals can control transmittance, reflectance, and absorbance in a spectrally selective manner across the visible-to-infrared spectrum. This talk will highlight recent advances in the design of electrochromic smart windows that provide on-demand modulation of visible and infrared sunlight with voltage-dependent dual-band variation of transmittance. Second, photonic integration of plasmonic metal oxide nanocrystals can amplify their light absorption, producing wavelength tunable and dynamically controllable absorption and emission across the infrared spectrum. Overall, metal oxide nanocrystals offer compelling opportunities as building blocks for dynamic and tunable optical materials with potential applications in energy management, optical communications, and more.