



DESIGNING SELF-REGULATING POROUS MATERIALS WITH INTERNAL FEEDBACK

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Living systems exhibit unique autonomous behaviors such as self-regulation, homeostasis and spontaneous motion that are largely absent in artificial materials. In this talk I'll show our contribution in translating these principles into artificial materials by programming internal feedback through porosity engineering. We integrate porous materials such as MOFs and sol-gel oxides into optical architecture. By applying light as an energy source, vapor adsorption-desorption generate internal feedback mechanisms that govern the time-dependent material response. This enables the design several porous devices exhibiting self-regulation or time programmable response: photonic devices for passive thermoregulation, light driven self-assembly, hybrid plasmonic metasurfaces that exhibit responses reminiscent of biological rhythms or 4D-printed microrobots for controlled de-icing.