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Stimuli-responsive cellulose-based nematogels QINGKUN LIU, IVAN SMALYUKH, University of Colorado at Boulder — Physical properties of composite materials can be pre-engineered by controlling their structure and composition at the mesoscale. Yet, approaches for achieving this are limited and rarely scalable. We introduce a new breed of self-assembled nematogels formed by an orientationally ordered network of thin cellulose nanofibers infiltrated with a thermotropic nematic fluid. The interplay of orientational ordering within the nematic network and that of the small-molecule liquid crystal around it yields a composite with highly tunable optical properties. By means of combining experimental characterization and analytical modeling, we demonstrate sub-milisecond electric switching of transparency and also facile response of the composite to temperature changes and light illumination. Finally, we discuss a host of potential technological uses of these self-assembled nematogel composites, ranging from smart and privacy windows to novel flexible display modes.

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