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Photonic Crystal Spectrometer NADIA PERVEZ, WARREN CHENG, ZHANG JIA, MARSHALL COX, Columbia University, HASSAN EDREES, Cooper Union, IOANNIS KYMISSIS, Columbia University — We have demonstrated a new kind of optical spectrometer employing photonic crystal patterns to selectively outcouple waveguided light from a transparent substrate. This photonic crystal spectrometer functions in a way fundamentally different from other spectrometers in that device size and resolution are decoupled. The system we present would be extremely inexpensive to manufacture, creating the potential for expansion of the spectrometer market. Our device consists of an array of photonic crystal patterns nanofabricated in a polymer on a glass substrate combined with an inexpensive camera. The camera captures an image of the light outcoupled from the patterned substrate; the array of patterns produces a spatially resolved map of intensities for different wavelength bands. The intensity map in the image is converted into a spectrum using the pattern response functions. We present a proof of concept by characterizing a white LED with our photonic crystal spectrometer.

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