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All-carbon optical diode BENOY ANAND, SSSIHL, Puttaparthi, India, RAMAKRISHNA PODILA, KIRAN LINGAM, Department of Physics, Clemson University, Clemson, SC 29634, REJI PHILIP, Raman Research Institute, Bangalore, India, APPARAO RAO, Department of Physics, Clemson University, Clemson, SC 29634, CLEMSON PHYSICS TEAM, SSSIHL, INDIA TEAM — Optical diodes that allow unidirectional transport of light, similar to an electronic p-n junction diode, are vital to manipulate and control light for information processing. These "optical diodes" have already been realized using photonic crystals (PC) with engineered periodicity. However, an important criterion for the functioning of a PC-based optical diode is that the periodicity of the PC should be on the same length scale as half the wavelength of the electromagnetic waves used. For the visible region of the electromagnetic spectrum, this periodicity must be $\sim$ 200-350 nm making the fabrication of PCs expensive, cumbersome and complicated. An optical diode based on the transmission of optical pulses through structures with an abrupt variation in the longitudinal nonlinear absorption coefficient, as opposed to periodic variation of refractive index or dielectric constant is demonstrated. In particular, we present the studies performed on an all carbon optical diode with C60 and graphene coated on quartz cover slips. We find that the reverse saturable absorption of C60 and the saturable absorption of graphene can be combined to obtain modest reciprocity factors for a solid-state all-carbon optical diode.

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