Title: SiC Multilayer Structures as Light Controlled Photonic Active Filters

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Abstract: Tunable wavelength division multiplexing converters based on amorphous SiC multilayer photonic active filters are analyzed. The configuration includes two stacked p-i-n structures (p(a-SiC:H)-i'(a-SiC:H)-n(a-SiC:H)-p(a-SiC:H)-i(a-Si:H)-n(a-Si:H)) sandwiched between two transparent contacts. The manipulation of the magnitude is achieved through appropriated front and back backgrounds. Transfer function characteristics are studied both theoretically and experimentally. An algorithm to decode the multiplex signal is established. An optoelectronic model supports the optoelectronic logic architecture. Results show that the light-activated device combines the demultiplexing operation with the simultaneous photodetection and self-amplification of an optical signal. The output waveform presents a nonlinear amplitude-dependent response to the wavelengths of the input channels. Depending on the wavelength of the external background and irradiation side, it acts either as a short- or a long-pass band filter or as a band-stop filter. A two-stage active circuit is presented and gives insight into the physics of the device.

Author Keywords: Optical sensors; Optical filters; Numerical and electrical simulations; Optoelectronic model

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