

Title: Optoelectronic Digital Capture Device Based on Si/C Multilayer Heterostructures

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Abstract: Combined tunable WDM converters based on SiC multilayer photonic active filters are analyzed. The operation combines the properties of active long-pass and short-pass wavelength filter sections into a capacitive active band-pass filter. The sensor element is a multilayered heterostructure produced by PE-CVD. The configuration includes two stacked SiC p-i-n structures sandwiched between two transparent contacts. Transfer function characteristics are studied both theoretically and experimentally. Results show that optical bias activated photonic device combines the demultiplexing operation with the simultaneous photodetection and self amplification of an optical signal acting the device as an integrated photonic filter in the visible range. Depending on the wavelength of the external background and irradiation side, the device acts either as a short- or a long-pass band filter or as a band-stop filter. The output waveform presents a nonlinear amplitude-dependent response to the wavelengths of the input channels. A numerical simulation and two building-blocks active circuit is presented and gives insight into the physics of the device.

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

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