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Title:Monolithic integration of ultrafast photodetector and MESFET in the GaN material system
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Abstract:We have fabricated and characterized ultrafast metal-semiconductor-metal (MSM) photodetectors integrated with metal-semiconductor-field-effect- transistors (MESFETs) integrated in coplanar strip lines in the GaN/AlN/SiC material system. We recorded electrical transients of the single photodetector as short as 0.9 ps wide by optoelectric pump-probe measurements using 360-nm-wavelength and 100-fs-duration laser pulses. Electric photoresponse transients of the photodetector with 6-mV peak amplitude were amplified by the MESFET, resulting in 4-ps-wide and 35-mV peak amplitude signals. This monolithically integrated optoelectronic circuit is presented as a potential candidate for high-speed ultraviolet optoelectronics. © 2011 IEEE.