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2D patterned GaN_xAs_{1-x} Quantum structures using Ion Implantation and Pulsed Laser Melting TAESEOK KIM, MICHAEL J. AZIZ, VENKATESH NARAYANAMURTI, School of Engineering and Applied Sciences, Harvard University — We will present two dimensionally patterned GaN_xAs_{1-x} nanostructures fabricated in a GaAs matrix using nitrogen ion implantation followed by pulsed laser melting and rapid thermal annealing (RTA). The arbitrarily patterned GaN_xAs_{1-x} regions are investigated by ballistic electron emission microscopy (BEEM), a three terminal scanning tunneling microscopy technique. BEEM can image both the surface topography and the local hot electron transport. Using ion implantation through a lithographically patterned mask and varying subsequent processing conditions such as nitrogen concentrations and laser fluences, we have made locally confined GaN_xAs_{1-x} dots. By analyzing BEEM images of the quantum dots, we study giant bandgap bowing effects on the Schottky barrier height. We will also discuss the effects of different implanted nitrogen concentrations, laser fluences and RTA conditions on the conduction band structures of GaN_xAs_{1-x}.

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