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Alumina and silicone oxide dielectric films for focal plane arrays based on InSb

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In this work the characterization of MIS structures In/Al_2O_3/InSb and In/SiO_x/anodic oxide/InSb were carried out. The A_2O_3 dielectric layer were deposited by atomic layer deposition (ALD) method. For second sample we applied combination of dielectrics which include anodic oxide film and SiO_x layer deposited by resistive evaporation method. For both structures we mapped fixed charge and interface trap level over 2 inch InSb wafers. The average value of fixed charge level, N_F, for MIS-structures In/Al_2O_3/InSb and In/SiO_x/anodic oxide/InSb were 1.4×10^{11} $cm^{-2}$and 2.9×10^{11} cm^{-2}, respectively. The dispersion of Dit values over the wafer in In/Al_2O_3/InSb MIS structure did not exceed 9 % that confirms feasibility Al_2O_3 insulators films deposited by ALD as a passivation coating for InSb based photodiode arrays.

Keywords: indium antimonide, atomic-layer deposition, passivation, dielectric films, high-k insulators, resistive evaporation, A_3B_5, MOS-structure, fixed charge, density of states, anodic oxide (AO), AFM, FPA, photosensitive elements.

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