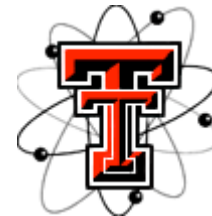




Physics Colloquium



Thursday, Oct 13th at 3:30 pm in SC 234

Dr. Alex Demkov

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Integrating films of functional transition metal oxides on semiconductors

Over a decade ago, McKee and co-workers achieved a breakthrough in the direct epitaxial growth of single crystal perovskite SrTiO₃ on Si(001). The ensuing development of crystalline epitaxial oxides on semiconductors (COS) has opened a new avenue for CMOS technology for materials other than Si, e.g. Ge and GaAs. It has also ushered in an even more tantalizing possibility of growing functional oxide nanostructures utilizing ferroelectricity, superconductivity, or magnetism, in monolithic integration with Si and Ge. In this talk, I will review our recent work on integrating functional oxides such as ferroelectrics and oxide heterostructures on Si(001) and Ge (001) for potential applications in electronics and photonics. I will also talk about potential applications of perovskite oxide heterostructures.

I hope to convince you that the current state of oxide electronics is similar to that of Si before Jack Kilby introduced large scale integration. Readily available semiconductor substrates offer an excellent integration platform, as well as an avenue to make hybrid logic/sensor devices. Because many of the properties of functional oxides are extremely sensitive to compositional and structural changes (e.g. atomic levels) the functionality of these hybrid devices can be tuned as never before.

Refreshments at 3:00 pm in SC 103