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Magnetocapacitance and surface magnetism in Pd/Fe/Pd trilayer structures[1] R.P. RAIRIGH, University of Florida, A.F. HEBARD, University of Florida — For sufficiently thin insulator spacing in metal-insulator-metal (M-I-M) trilayer structures, the capacitance can be dominated by the interface of the dielectric and the electrodes. If one or both of the electrodes are ferro- or paramagnetic, the screening length is influenced by a difference in the spin-up and spin-down densities of states, and the resulting magnetic-field induced changes in capacitance (magnetocapacitance) become a sensitive measure of surface magnetism. We have grown Pd (200 Å)/Fe (1.5 Å)/Pd (x Å) trilayer structures, where x was varied from 50 Å to 2 Å. All of the films are ferromagnetic having similar saturation magnetizations at 10 K. However, as x is decreased, there is a significant increase in the coercive field (H_c) from H_c ∼7 Oe for $x = 50$ Å to H_c ∼30 Oe for $x = 2$ Å. The sensitivity of magnetic properties to the proximity of the interface reflects a cross over from bulk to surface-dominated magnetism. We will correlate this crossover with magnetocapacitance measurements on MIM capacitors where the Pd/Fe/Pd trilayer is the base electrode and x is the separation of the Fe layer from the interface with the dielectric of the capacitor.

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