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Interfacial multiferroism and giant magnetoelectricity in nanocapacitors JAMES RONDINELLI, MASSIMILIANO STENGEL, NICOLA SPALDIN, Materials Department, University of California, Santa Barbara — We present results of density functional calculations of the dielectric and magnetic responses of $SrRuO_3/SrTiO_3/SrRuO_3$ oxide heterostructures. Our calculations indicate the spatial coexistence of magnetic and polar behavior at the metal-insulator interface, suggesting a route to a new type of *interfacial multiferroic*. We also find a giant magnetoelectric response, and comment on the control of this magnetoelectric effect as a means to realizing new devices and sensors. Such devices should be feasible as the ability to fabricate and functionalize new complex materials continues to grow. By controlling the interacting charge, spin and lattice degrees of freedom at interfaces, it is then possible to tune the interactions between layers to create new electric or magnetic phases that are accessible with applied fields.

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