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Giant Flexoelectric Effect in Ferroelectric Epitaxial Thin Films TAE WON NOH, DAESU LEE, Department of Physics and Astronomy, Seoul National University, A. YOON, M. KIM, Department of Materials Science and Engineering, Seoul National University, J.-G. YOON, Department of Physics, University of Suwon, J.-S. CHUNG, Department of Physics and CAMDRC, Soongsil University, J.F. SCOTT, Department of Physics, University of Cambridge, UK — The flexoelectric effect describes an electric field that is generated by a strain gradient. Owing to its universal nature, flexoelectricity has inspired broad scientific interest and has application potential, particularly in flexible systems. In solids, however, there has been little investigation into flexoelectricity, due to its minuscule magnitude by limited elastic deformation. In this presentation, we will develop a general framework for realizing and modulating the giant flexoelectric effect in epitaxial oxide thin films, emphasizing the key role of flexoelectricity in solids.[1] In epitaxial oxide thin films, a lattice mismatch between the film and the substrate can result in strain relaxation within tens of nanometers of the film/substrate interface, inducing a large strain gradient. We observed the nanoscale strain gradients in ferroelectric $HoMnO_3$ epitaxial thin films, which were 6 or 7 orders of magnitude larger than typical values reported for bulk oxides. Giant flexoelectric effect by the nanoscale strain gradient provides a means of tuning the physical properties of ferroelectric epitaxial thin films, such as domain configurations and hysteresis curves.[2]

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[1]D. Lee *et al.*, Phys. Rev. Lett. **107**, 057602 (2011).
[2]D. Lee *et al.*, Phys. Rev. B **81**, 012101 (2010).

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