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Lattice-Tuned Magnetism of $Ru^{4+}(4d^4)$ Ions in Single-Crystals of the Layered Honeycomb Ruthenates: Li_2RuO_3 and Na_2RuO_3[1] JINCHEN WANG, Renmin Univ of China, JASMINKA TERZIC, TONGFEI QI, University of Kentucky, FENG YE, Oak Ridge National Laboratory, SHUJUAN YUAN, SAICHARAN ASWARTHAM, University of Kentucky, SERGEY STRELTSOV, Ural Federal University, DANIEL KHOMSKII, Universitaet zu Koeln, RIBHU KAUL, GANG CAO, University of Kentucky — We synthesize and study single crystals of the layered honeycomb lattice Mott insulators Na_2RuO_3 and Li_2RuO_3 with magnetic $Ru^{4+}(4d^4)$ ions. The newly found Na_2RuO_3 features a nearly ideal honeycomb lattice and orders antiferromagnetically at 30 K. Single-crystals of Li_2RuO_3 adopt a honeycomb lattice with either C2/m or more distorted $P2_1/m$ below 300 K, depending on detailed synthesis conditions. We find that Li_2RuO_3 in both structures hosts a well-defined magnetic state, in contrast to the singlet ground state found in polycrystalline Li_2RuO_3. A phase diagram generated based on our results uncovers a new, direct correlation between the magnetic ground state and basal-plane distortions in the honeycomb ruthenates.

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