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Title:	First-order magnetostructural transition in single crystals of the honeycomb lattice ruthenate Li_2RuO_3
Authors:	Mehlawat, K. (/jspui/browse?type=author&value=Mehlawat%2C+K.) Singh, Yogesh (/jspui/browse?type=author&value=Singh%2C+Yogesh)
Keywords:	Li_2RuO_3 crystallize magnetostructural
Issue Date:	2017
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Citation:	Physical Review B, 95 (7)
Abstract:	<p>Li_2RuO_3 is known to crystallize in either $C2/m$ or $P2_1/m$ structures at room temperature. We report the first single crystal growth of Li_2RuO_3 and Na substituted crystals $(\text{Li}_{0.95}\text{Na}_{0.05})_2\text{RuO}_3$ crystallizing in the $P2_1/m$ structure where a first order magnetostructural transition is observed at high temperatures. Using high temperature ($T \leq 1000$ K) magnetic susceptibility χ measurements we study the magnetic anisotropy across the magnetostructural transition. Our results show that for Li_2RuO_3 the magnetic and structural transitions most likely occur at slightly different temperatures. The structural transition which is first-order-like occurs first (Tonset ≈ 570 K) and drives the magnetic transition ($T \approx 540$ K). Rather surprisingly, just 5% Na substitution for Li affects the magnetostructural transition in an interesting way. The first order transition temperature remains at ≈ 540 K, the magnetic anisotropy is reversed, and the Ru-Ru dimerization pattern changes from two short and four long Ru-Ru bonds per honeycomb in an armchair pattern for Li_2RuO_3 to four short and two long bonds per honeycomb in $(\text{Li}_{0.95}\text{Na}_{0.05})_2\text{RuO}_3$ which can be viewed as two interpenetrating armchair patterns.</p>
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