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***In-Situ* X-ray Absorption Spectroscopy Study of Li[LiMnNi]O2 Cathode Material** CHERNO JAYE, National Institute of Standards and Technology, FAISAL M. ALAMGIR, Geogia Institute of Technology, NICOLE LEIFER, Hunter College, CUNY, JAY WHITACRE, Carnegie Mellon University, STEVE G. GREENBAUM, Hunter College, CUNY — The cation/Li substituted Li[LiM]O2 layered material (where M is typically a blend of Mn, Ni and Co) is a promising high-capacity Li-ion battery cathode material due to the fact that it has yielded capacities exceeding 240 mAh/g, and up to 285 mAh/g even after many (50) deep-discharge cycles at useable charge/discharge rates (C/20). In an effort to understand the origin and relevance of the substantial irreversible capacity observed during the first charge cycle at a potential of approximately 4.5 V vs. Li, we have performed an *in-situ* x-ray absorption spectroscopy (XAS) study of the charge compensation mechanism associated with the charge/discharge of Li[LiMnNi]O2 cathode material. XAS at the Ni and Mn K edges were carried out during the first two charge cycles of a layered Li[Li0.17Mn0.58Ni0.25]O2 powder based electrode system using an in-situ cell. The XAS results provide information about the electronic and atomic structure around the metals as a function of state of charge.

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