Electrochemical and Solid-State Letters
esl.ecsdl.org

doi: 10.1149/1.1738551
Electrochem. Solid-State Lett. 2004 volume 7, issue 7, A194-A197

Suppression of Toxic Compounds Produced in the Decomposition of Lithium-Ion Battery Electrolytes

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Abstract

Liquid electrolytes typically used in commercial lithium-ion batteries are comprised of lithium hexafluorophosphate in carbonate solvents. This electrolyte undergoes thermal decomposition at moderately elevated temperatures (80-100°C), encountered in the normal operation of these rechargeable power sources, to quantitatively generate highly toxic alkylfluorophosphates. The decomposition occurs via an autocatalytic mechanism initiated by trace impurities of water or alcohol. The thermal decomposition is inhibited in the presence of lithium metal oxides frequently used as the cathode of lithium-ion batteries or Lewis basic additives.

Key Words

lithium compounds secondary cells electrolytes pyrolysis catalysis electrochemical electrodes

Manuscript received November 7, 2003.
Revised manuscript received December 10, 2003.
Available electronically May 12, 2004.

1099-0062/2004/7(7)/A194/4/

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