

# Materials for Electrochemistry

Will one of these materials be the foundation for a future generation of power source or energy storage devices? Research "just keeps going and going" on battery and fuel cell improvements, and many of the studies revolve around the lithium and lithium mixed-metal compounds featured here. Lithium cobalt oxide ( $\text{LiCoO}_2$ ) is a critical substance in the two-pronged quest to develop high performance, advanced batteries.<sup>1</sup>

## RECENT STUDIES INCLUDE:

A high-energy, new battery system using only inorganic constituents has been designed—Li and  $\text{LiCoO}_2$  serve as the electrodes in a  $\text{LiAlCl}_4$ -in- $\text{SO}_2$  liquid electrolyte.<sup>2</sup> Promising results were also obtained using niobium(V) oxide as an alternate electrode to lithium metal in advanced cells.<sup>3</sup> Lithium manganate ( $\text{Li}_2\text{MnO}_3$ ) has been used in the synthesis of cathode-active materials<sup>4</sup> and the further development of coin-type lithium secondary batteries.<sup>5</sup>

Lithium ferrate ( $\text{LiFeO}_2$ ) and  $\text{LiCoO}_2$  were studied for use as porous cathodes in molten carbonate fuel cells with potentially long life,<sup>6,7</sup> while other lithium products including  $\text{Li}_2\text{MoO}_4$  were used in comparative property studies of battery systems.<sup>8</sup> Several studies have been done on the cell performance characteristics and reaction products of  $\text{LiAlCl}_4$  and  $\text{LiGaCl}_4$  in a variety of battery systems.<sup>9-11</sup> The surface chemistry of Li electrodes in ethereal  $\text{LiAsF}_6$  was tested with new salts for potential battery systems.<sup>12</sup>

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<b>NEW</b> 44,270-4	Lithium cobalt(III) oxide, 99%	25g; 100g
<b>NEW</b> 44,271-2	Lithium iron(III) oxide, 95%	100g; 500g
<b>NEW</b> 44,272-0	Lithium manganese(IV) oxide	100g; 500g
30,831-5	Lithium hexafluoroarsenate(V), 98%	10g; 50g
<b>NEW</b> 42,649-0	Lithium-aluminum alloy	5g; 25g
40,093-9	Lithium titanate, -325 mesh	100g; 500g
40,090-4	Lithium molybdate, 99%	50g; 250g
40,088-2	Lithium dichromate hydrate, tech.	25g; 100g
26,600-0	Lithium, ribbon, 99.9%	25g; 100g
<b>NEW</b> 45,114-2	Lithium tetrachloroaluminate, anhydrous, beads, -10 mesh, 99.99%	5g; 25g
<b>NEW</b> 45,115-0	Lithium tetrachlorogallate, anhydrous, powder, 99.99+%	5g; 25g
<b>NEW</b> 44,728-5	Thionyl chloride, low iron, 99.5%	5mL; 100mL; 1L
29,569-8	Sulfur dioxide, 99.9+%	454g



References: (1) Zhecheva, E. et al. *Chem. Mater.* **1996**, *8*, 1429. (2) Doege, V. et al. *Proc. Annu. Battery Conf. Appl. Adv.*, 10th: Frank, H.A.; Oman, H., Eds.; IEEE: New York, 1995; p 313; *Chem. Abstr.* **1995**, *122*, 218495z. (3) Koshiba, N. et al. *Denki Kagaku oyobi Kogyo Butsuri Kagaku* **1995**, *63*, 153; *Chem. Abstr.* **1995**, *122*, 192302g. (4) Hanafusa, K. et al. *Proc. Electrochem. Soc.* **1993**, *93-23*, 401; *Chem. Abstr.* **1994**, *120*, 34442g. (5) Saito, T. et al. *ibid.* **1993**, *93-23*, 355; *Chem. Abstr.* **1994**, *120*, 81425p. (6) Bloom, I.D. et al. *Morgantown Energy Technol. Cent., Proceedings of the Fuel Cells 94 Contractors Review Meeting*, **1994**, 41; *Chem. Abstr.* **1996**, *124*, 150796g. (7) Makkus, R.C. et al. *J. Electrochem. Soc.* **1994**, *141*, 3429; *Chem. Abstr.* **1995**, *122*, 60105k. (8) Nazar, L.F. et al. *J. Mater. Chem.* **1995**, *5*, 1985. (9) Kilroy, W.P. et al. *Proc. Power Sources Conf.* **1994**, *36th*, 358; *Chem. Abstr.* **1996**, *124*, 181026k. (10) Hill, I.R. et al. *J. Electrochem. Soc.* **1995**, *142*, 3267; *Chem. Abstr.* **1995**, *123*, 324422d. (11) Golezdzinowski, M. et al. *J. Power Sources* **1995**, *54*, 356; *Chem. Abstr.* **1995**, *123*, 37145k. (12) Aurbach, D. et al. *Electrochim. Acta* **1996**, *41*, 747; *Chem. Abstr.* **1996**, *124*, 244879p.

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