

(19) World Intellectual Property
Organization
International Bureau



(43) International Publication Date
9 December 2004 (09.12.2004)

PCT

(10) International Publication Number
WO 2004/107480 A3

(51) International Patent Classification⁴: **H01M 4/48**,
4/50, 4/52

(21) International Application Number:
PCT/CA2004/000770

(22) International Filing Date: 27 May 2004 (27.05.2004)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
60/473,476 28 May 2003 (28.05.2003) US

(71) Applicant (for all designated States except US): **NATIONAL RESEARCH COUNCIL OF CANADA**
[CA/CA]; 1200 Montreal Road, Bldg. M-58, Room
EG-12, Ottawa, Ontario K1A 0R6 (CA).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **WHITFIELD, Pamela** [CA/CA]; Apt. 512, 124 Springfield Road,
Ottawa, Ontario K1M 2C8 (CA). **DAVIDSON, Isobel**
[CA/CA]; 1569 Delia Crescent, Orleans, Ontario K4A
2X7 (CA).

(74) Agent: **ANDERSON, J., Wayne**; National Research
Council of Canada, Intellectual Property Services Office,
EG-12, Bldg. M-58, 1200 Montreal Road, Ottawa, Ontario
K1A 0R6 (CA).

(81) Designated States (unless otherwise indicated, for every
kind of national protection available): AE, AG, AL, AM,
AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN,
CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI,
GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE,
KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD,
MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG,
PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM,
TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM,
ZW.

(84) Designated States (unless otherwise indicated, for every
kind of regional protection available): ARIPO (BW, GH,
GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM,
ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM),
European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI,
FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI,
SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ,
GW, ML, MR, NE, SN, TD, TG).

Published:

- with international search report
- before the expiration of the time limit for amending the
claims and to be republished in the event of receipt of
amendments

(88) Date of publication of the international search report:
3 November 2005

For two-letter codes and other abbreviations, refer to the "Guidance
Notes on Codes and Abbreviations" appearing at the beginning
of each regular issue of the PCT Gazette.

(54) Title: LITHIUM METAL OXIDE ELECTRODES FOR LITHIUM CELLS AND BATTERIES

(57) Abstract: A lithium metal oxide positive electrode for a non-aqueous lithium cell or battery is disclosed. The positive electrode comprises a lithium metal oxide having a layered structure and a general formula, after in-situ or ex-situ oxidation, of $\text{Li}_x\text{Mn}_y\text{M}_{1-y}\text{O}_2$ wherein $0 \leq x \leq 0.20$, $0 < y < 1$, manganese is in the 4+ oxidation state, and M is one or more the first row transition metals: Ti, V, Cr, Mn, Fe, Co, Ni or Cu, or other specific other canons: Al, Mg, Mo, W, Ta, Si, Sn, Zr, Be, Ca, Ga, and P, which have an appropriate ionic radii to be inserted in to the structure without unduly disrupting it. Usage of the materials of the invention in lithium cells and batteries is disclosed. A process is disclosed for formation of materials of the invention.



WO 2004/107480 A3