

## Patents

Giselle Sandí, Randall E. Winans, and Kathleen Carrado Gregar. “Carbon-Based Anodes for Lithium Batteries using Sepiolite Clay as a Template”

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Invention Report: 6/30/98

Award date: 08/31/00

Patent number: US 6110621

Giselle Sandí-Tapia and Kathleen Carrado Gregar. “Polymer Nanocomposites for Lithium Ion Applications”.

Invention number: ANL-IN-01-097

Invention report: 08/13/01

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## Publications

1. G. Sandí, K. A. Carrado, and R. E. Winans. *Templated Carbon Produced from Pillared Clay and Pyrene as the Organic Precursor*. In *Materials Syntheses*, Book Series. 2006, in press. U. Schubert, editor. Invited Manuscript.
2. G. Sandí, K. A. Carrado, and R. E. Winans. *Novel Carbon Produced from Sepiolite Clay and Propylene as the Organic Precursor*. In *Materials Syntheses*, Book Series. 2006, in press. U. Schubert, editor. Invited Manuscript.
3. L. J. Smith, R. Klingler, G. Sandí, and M-L. Saboungi. *A <sup>2</sup>H Solid-State Nuclear Magnetic Resonance Study of the Dynamics of Clay-Polymer Nanocomposites*. Submitted to *Advanced Materials*. January, 2007.
4. C-K. Back, G. Sandí, J. Prakask, and J. Hranisavljevic. *Hydrogen Sorption on Palladium-doped Sepiolite-derived Carbon Nanofibers*. *Journal of Physical Chemistry B* 2006, 110, 16225-16231.
5. C. S. Johnson, K. Lauzze, N. Kanakaris, A. Kahaian, M. M. Thackeray, G. Sandí, S. A. Hackney, and R. O. Rigney. *Electrochemical Performance of Ni/Cu-Metallized & Carbon-Coated Graphites for Lithium Batteries*. In *New Carbon Based Materials for Electrochemical Energy Storage Systems*. NATO Science Series Book II. Mathematics, Physics and Chemistry, Vol.229, pages 357-376. Co-editors, I. Barsukov , C. S. Johnson, J. Doninger, and V. Barsukov. Springer 2006.
6. K. A. Carrado and G. Sandí. *Metal Nanoparticles on Polymer-Clay Nanocomposite Films Derived from Synthetic Hectorite*. Invited submission to CMS Workshop Lecture Series on “Polymer-Clay Nanocomposites” (based on a meeting to be held in Poitiers, France, June 2006); volume 14, published by The Clay Minerals Society. April 30, 2006.

7. L. G. Scanlon, P. B. Balbuena, Y. Zhang, G. Sandí, C. K. Back, W. A. Feld, J. Mack, M. A. Rottmayer, J. L. Riepenhoff. *Investigation of Corannulene for Molecular Hydrogen Storage via Computational Chemistry and Experimentation. Journal of Physical Chemistry B* 2006, 110, 7688-7694.
8. D. A. Grossie, W. A. Feld, L. G. Scanlon, G. Sandí, Z. Wawrzak. *A Crystallographic Examination of Dilithium Phthalocyanine. Acta Crystallography*, E62, 827–829 (2006).
9. G. Sandí, R. Kizilel, K. A. Carrado, R. Fernández-Saavedra, and N. Castagnola. *Effect of the Silica Precursor on the Conductivity of Hectorite-Derived Polymer Nanocomposites. Electrochimica Acta*, 50, 3891-3896 (2005).
10. G. Sandí. *Microporous and Mesoporous Materials* 81, 375-376 (2005). Book Review: Handbook of Layered Materials, Marcel Dekker, New York, NY, 2004. Auerbach, K. A. Carrado, and P. K. Dutta (Eds.).
11. K. A. Carrado; G. Sandí; R. Kizilel; S. Seifert; N. Castagnola. *Platinum Nanoclusters Immobilized on Polymer-clay Nanocomposite Membranes. Applied Clay Science* 30, 94-102 (2005).
12. G. Sandí. *Hydrogen Storage and its Limitations. In Interface: The Electrochemical Society Magazine*. K. Rajeshwar (editor). Fall 2004, 40-44. Invited Article.
13. G. Sandí. *Development of New Anodes for Rechargeable Lithium Batteries and their SEI Characterization by RAMAN and NEXAFS Spectroscopy. In Lithium-Ion Batteries Solid-Electrolyte Interphase*, Chapter 7, pages 308-336. P. Balbuena and Y. Wang (editors). Imperial College Press and World Scientific Publishers (2004).
14. Z. Gu, G. Sandí, and P. B. Balbuena. *Molecular Dynamics Characterization of Polymer Confinement in Nanocomposite Catalytic Membranes. Journal of New Materials for Electrochemical Systems*, 7 (1), 7-12 (2004).
15. M. Ma, V.S. Donepudi, G. Sandí, Y. K. Sun, and J. Prakash. *Electrodeposition of Nano-Structured Nickel- 21% Tungsten Alloy and Evaluation of Oxygen Reduction Reaction in a 1% Sodium Hydroxide Solution. Electrochimica Acta*. 49, 4411–4416 (2004).
16. P. J. Moon, G. Sandí, D. Stevens, and R. Kizilel. *Computational Modeling of Ionic Transport in Continuous and Batch Electrodialysis. Separation Science and Technology* 39 (11), 2531-2555 (2004).
17. L. G. Scanlon, L. R. Luente, W. A. Feld, G. Sandí, P. Balbuena, and A. Turner. *Composite Cathode with Li<sub>2</sub>Pc. Journal of the Electrochemical Society*. 151(9), A1338-A1343 (2004).
18. N. A. Tapan, W. E. Mustain, B. Gurau, G. Sandí and J. Prakash. *Investigation of Methanol Oxidation Electrokinetics on Pt Using the Asymmetric Electrode Technique*.

- Journal of New Materials for Electrochemical Systems* 7, 281-286 (2004).
19. G. Sandí. *Raman and NEXAFS Spectroscopy Characterization of Templatized Carbon Anodes.* *Journal of New Materials for Electrochemical Systems* 6, 181-189 (2003).
  20. P. Moon, G. Sandí, R. Kizilel, and D. Stevens. *Computational Simulation of Lithium Ions Transport through Polymer Nanocomposite Membranes.* *Journal of New Materials for Electrochemical Systems* 6 (4), 237-244 (2003).
  21. G. Sandí, H. Yang, H. Joachin, K. A. Carrado, R. E. Winans, and J. Prakash. *Determination of the Hydrogen Storage Capacity of Novel Sepiolite-Derived Carbonaceous Materials.* *Journal of New Materials for Electrochemical Systems* 6, 169-173 (2003).
  22. G. Sandí, H. Joachin, H. Yang, and J. Prakash. *Electrochemical Performance of Lithium Ion Batteries Prepared with Sepiolite-Derived Carbons and Lithium Transition Metal Oxide Positive Electrodes.* *Journal of New Materials for Electrochemical Systems* 6, 175-179 (2003).
  23. G. Sandí, *Nuevas Fuentes de Energía: Baterías Primarias y Secundarias*, In *Electroquímica y Electrocatalisis. Materiales: Aspectos fundamentales y Aplicaciones*. N. Alonso-Vante (editor), Volume 1b, Chapter 10 (2003) pages 123-155. Ciudad Educativa, Buenos Aires, Argentina.
  24. G. Sandí, H. Joachin, W. Lu, J. Prakash, and G. Tassara. *Comparison of the Electrochemical Performance of Carbon Produced from Sepiolite with Different Surface Area Characteristics.* *Journal of New Materials for Electrochemical Systems* 6 (2), 75-80, 2003.
  25. G. Sandí, H. Joachin, R. Kizilel, S. Seifert, and K.A. Carrado. *In Situ SAXS Studies of the Structural Changes of Polymer Nanocomposites Used in Battery Applications.* *Chemistry of Materials* 15 (4), 838-843, 2003.
  26. G. Sandí, K. A. Carrado, H. Joachin, W. Lu, and J. Prakash. *Polymer Nanocomposites for Lithium Battery Applications.* *Journal of Power Sources*. 119-121, 492-496, 2003.
  27. G. Sandí, N. R. Khalili, W. Lu, and J. Prakash. *Electrochemical Performance of Carbon Materials Derived from Paper Mill Sludge.* *Journal of Power Sources*, 119-121, 34-38, 2003.
  28. G. Sandí, R. E. Winans, S. Seifert, and K. A. Carrado. *In Situ SAXS Studies of the Structural Changes of Sepiolite Clay and Sepiolite-Carbon Composites with Temperature.* *Chemistry of Materials* 14 (2), 739-742 (2002).
  29. K. C. Littrell, N. R. Khalili, M. Campbell, G. Sandí, and P. Thiagarajan. *Micro Structural Analysis of Carbons Prepared from Paper Mill Sludge by SANS and BET.*

- Chemistry of Materials* 14 (1), 327-333 (2002).
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  31. G. P. Wiederrecht, G. Sandí, K. A. Carrado, and S. Seifert. *Intermolecular Dimerization within Pillared Layered Clay Templates*. *Chemistry of Materials* 13 (11), 4233-4238 (2001).
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  34. G. Sandí, K. L. Brubaker, J. F. Schneider, H. J. O'Neill , and P. L. Cannon Jr. *A Coulometric Iodimetric Procedure for Measuring the Purity of Lewisite*. *Talanta*, 54-55, 913-925 (2001).
  35. K. Song and G. Sandí. *Characterization of Montmorillonite Surfaces after Organosilane Modification*. *Clay and Clays Minerals*, 49 (2), 119-125 (2001).
  36. M. Campbell, N. R. Khalili, G. Sandí, and Janusz Gola. *Production of Micro- and Mesoporous Activated Carbon from Paper Mill Sludge: Effect of Zinc Chloride Activation*. *Carbon*, 38 (14), 1905-1915 (2000).
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  39. G. Sandí, R. E. Gerald II, L. Scanlon, C. Johnson, R. J. Klingler, and J. W. Rathke. *Molecular Orbital and Li-7 NMR Investigation of the Influence of Curved Lattices in Lithium Intercalated Carbon Anodes*. *Journal of New Materials for Electrochemical Systems* 3, 13-19, 2000.
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- of Lithium Bonding in Lithium Intercalated Carbon Anodes. Journal of Power Sources.* 81-82, 176-181 (1999).
42. G. Sandí, K. A. Carrado, R. E. Winans, C. S. Johnson, and R. Csencsits, *Carbons for Lithium Batteries Applications Prepared Using Sepiolite as an Inorganic Template. J. Electrochem. Soc.*, 146, 3644-3648 (1999).
43. G. Sandí, P. Thiyagarajan R. Winans, and K. Carrado. *Small Angle Neutron Scattering Analysis of Novel Carbons for Lithium Secondary Batteries.* In Materials Research Using Cold Neutrons at Pulsed Neutron Sources, P. Thiyagarajan, F. Trouw, B. Marzec, C-K Loong (editors), World Scientific, Singapore, 1999, p. 196-200.
44. G. Sandí, P. Thiyagarajan, K. A. Carrado, and R. E. Winans. *Small Angle Neutron Scattering Characterization of the Porous Structure of Carbons Prepared Using Inorganic Templates. Chem. Mater.*, 11 (2), 235-240 (1999).
45. G. Sandí, K. Song, K. A. Carrado and R. E. Winans. *A NEXAFS Determination of the Electronic Structure of Carbons for Lithium-Ion Cells. Carbon* 36 (12), 1755 (1998).
46. G. Sandí, R. E. Winans, K. A. Carrado, C. S. Johnson and P. Thiyagarajan. *Electrochemical and Spectroscopic Studies of Novel Carbonaceous Materials Used in Lithium Ion Cells. J. New Mater. Electrochem. Syst.* 1, 83 (1998). (Invited manuscript).
47. G. Sandí, R. E. Winans, and K. A. Carrado. *New Carbon Electrodes for Secondary Lithium Batteries. J. Electrochem. Soc.* 143, L95-98 (1996).
48. G. Sandí and P. Vanýsek. *Impedance and Voltammetric Studies of Electrogenerated Polyaniline Conducting Films. Synthetic Metals*, 64, 1 (1994).

## Proceedings

1. G. Sandí, K. A. Carrado, R. Kizilel, N. Castagnola, B. Lee, and S. Seifert. *In situ SAXS and GISAXS Studies of Polymer Nanocomposite Membranes for Energy Applications.* Preprint Am. Chem. Soc. Div. Fuel Chem. Prepr., 2005, 50.
2. K. A. Carrado, R. Kizilel, G. Sandí, C. L. Marshall, and M. Castagnola. *Catalytic Nanocomposite Membranes for CO Abatement in Fuel Cell Applications.* Preprint Am. Chem. Soc. Div. Fuel Chem. Prepr., 2004, 49 (1).
3. R. Kizilel, G. Sandí, H. Joachin, K. A. Carrado, V. H. Pérez-Luna. *Catalytic Membranes for CO Toleration in Fuel Cell Applications.* Proceedings to the AIChE 2003 National Meeting, San Francisco, CA, November 16-21, 2003.
4. G. Sandí, R. Kizilel, H. Joachin, H. Yang, L.G. Scanlon, L.R. Luente, W. A. Feld, P. B. Balbuena, S. Seifert, and A. Turner. *In Situ SAXS Studies of the Structural Changes of*

*Lithium Phthalocyanine (Li<sub>2</sub>Pc) Solid State Electrolyte Used in Rechargeable Systems.* Proceedings of the Symposium on Electrolytes for Lithium Ion Batteries. K. M. Abraham (editor). The Electrochemical Society, October 2003.

5. G. Sandí, R. Kizilel, H. Joachin, K.A Carrado, S. Seifert, L. J. Smith, and R. E. Gerald. *Characterization of Polymer Nanocomposites Used in Rechargeable Systems.* Preprint Am. Chem. Soc. Div. Fuel Chem. Prepr., 2003, 48 (1) 483-484.
6. R. Kizilel, N. Khalili, G. Sandí, and R. J. Selman. *Application of SANS in Analysis of Fuel Cell Cathode Ion Exchange Membranes.* Preprint Am. Chem. Soc. Div. Fuel Chem. Prepr., 2003, 48 (1), 443-444.
7. L. J. Smith, J.-M. Zanotti, G. Sandí, K. A. Carrado, P. Porion, A. Delville, D. L. Price, and M.-L. Saboungi. *Characterization of Polymer Clay Nanocomposite Electrolyte Motions via Combined NMR and Neutron Scattering Studies. Solid-State Ionics*, 2002, Eds: P. Knauth, J-M. Tarascon, E. Traversa, H.L. Tuller (MRS Symp. Proc., Vol. 756), 2003, 339-344.
8. K. C. Littrell, N. R. Khalili, M. Campbell, G. Sandí, and P. Thiagarajan. *Structural Characterization of Activated Carbon Adsorbents Prepared from Paper Mill Sludge.* Proceedings of the International Conference on Neutron Scattering, München, Germany, September 9-13, 2001.
9. L. G. Scanlon, L. R. Luente, W. A. Feld, G. Sandí, D. J. Campo, A. E. Turner, R. Csencsits, and S. J. Rodrigues. *Lithium Ion Conducting Channel.* Proceedings of the 7th Workshop for Battery Development, June 25-28, 2001, Philadelphia, Pa. Invited talk.
10. L. G. Scanlon, L. R. Luente, W. A. Feld, G. Sandí, D. J. Campo, A. E. Turner, C. S. Johnson, R. A. Marsh. *Lithium-Ion Conducting Channel.* Proceedings of the International Workshop on Electrochemical Systems. Proceedings - Electrochemical Society (2001), 2000-36 (Interfaces, Phenomena, and Nanostructures in Lithium Batteries), 326-339.
11. G. Sandí, C. S. Johnson, R. E. Gerald, R. Klingler, K. A. Carrado, and R. E. Winans. *Electrochemical Performance of Sepiolite-Derived Carbon with Lithium Transition Metal Oxide Positive Electrodes.* In *Electrochemistry of Carbon Materials*, K. Zaghib, D. Belanger, and M. T. McDermott, Editors, PV 2000-34. The Electrochemical Society Proceedings Series, Pennington, NJ (2000). Proceedings to the 198th Meeting of the Electrochemical Society, Phoenix, AZ, October 22-27, 2000.
12. K. L. Brubaker, J. F. Schneider, H. J. O'Neill, and G. Sandí. *A Coulometric Iodimetric Procedure for Measuring the Purity of Lewisite (CASARM).* Final Report, prepared for U.S. Army Edgewood Chemical, Biological Center, Operations Directorate, CASARM Quality Assurance Team, Aberdeen Proving Ground, Maryland. (September, 2000).
13. R. A. Guidotti, and G. Sandí. *Comparison of the Electrochemical Properties of Several Commercial Graphites with a Templated Disordered Carbon.* Proceedings of the 39th

Power Sources Conference, 81 (2000).

14. G. Sandí, K. A. Carrado, R. E. Winans, C. S. Johnson and K. D. Kepler. *Carbons for Lithium Ion Cells Prepared Using Sepiolite as an Inorganic Template.* In *Lithium Batteries*, S. Surampudi and R. A. Marsh, Editors, PV 98-16, p.11-18. The Electrochemical Society Proceedings Series, Pennington, NJ (1999). Proceedings of the Lithium Battery Symposium, 194th Meeting of the Electrochemical Society, November 1-6, 1998, Boston, MA.
15. G. Sandí, R. E. Gerald, R. J. Klingler, J. W. Rathke, K. A. Carrado, and R. E. Winans. *Studies of Electrolyte Penetration in Carbon Anodes by NMR Techniques.* In *Lithium Batteries*, S. Surampudi and R. A. Marsh, Editors, PV 98-16, p. 400-407. The Electrochemical Society Proceedings Series, Pennington, NJ (1999). Proceedings of the Lithium Battery Symposium, 194th Meeting of the Electrochemical Society, November 1-6, 1998, Boston, MA.
16. G. Sandí, R. E. Gerald II, L. G. Scanlon, K. A. Carrado, and R. E. Winans. *Computational, Electrochemical and <sup>7</sup>Li NMR Studies of Lithiated Disordered Carbon Electrodes in Lithium Ion Cells.* Mater. Res. Soc. Symp. Proc., Materials for Electrochemical Energy Storage and Conversion II-Batteries, Capacitors and Fuel Cells 496, 95, (1998).
17. L. G. Scanlon and G. Sandí. *Influence of Corannulene's Curved Carbon Lattice ( $C_{20}H_{10}$ ) on Lithium Intercalation.* Proceedings of the 33rd Intersociety Conversion Engineering Conference (IECEC), Vol 1, 223, Colorado Springs, CO, August 2-6, 1998. Invited paper.
18. L. G. Scanlon and G. Sandí. *Lithium-Endohedral  $C_{60}$  Complexes.* Proceedings of the 38th Power Sources Conference, Cherry Hill, NJ June 8-11, Vol 1. p.382-385, 1998.
19. R. E. Gerald II, R. J. Klingler, J. W. Rathke, G. Sandí, and K. Woelk *In Situ Imaging of Charge Carriers in an Electrochemical Cell.* In *Spatially Resolved Magnetic Resonance.* P. Blümller, B. Blümich, R. Botto, and E. Fukushima (editors). Chapter 9, 111, 1998. Proceedings of the 4th ICMRM, Albuquerque, NM, September 21-25, 1997.
20. L. G. Scanlon, D. M. Storch, J. H. Newton, and G. Sandí. *A Theoretical Study of Carbon Lattice System for Lithium Intercalated Carbon Anodes.* Proceedings, 32nd Intersociety Energy Conversion and Engineering Conference, Volume 1, pp. 87-92. Honolulu, Hawaii, July 27-August 1st, 1997.
21. R. E. Winans, G. Sandí, K. A. Carrado, and P. Thiagarajan. *Structure of Carbons Prepared with Pillared Clay Templates.* Proceedings, 23rd Biennial Conference on Carbon 2, 150 (1997). State College, PA, July 13-18. Invited paper.
22. G. Sandí, R. E. Winans, K. A. Carrado, and C. S. Johnson. *Novel Carbonaceous Materials for Lithium Secondary Batteries.* Proceedings, 2nd International Symposium

on New Materials for Fuel Cells and Modern Battery System1, 415 (1997). Montreal, Canada, July 6-10.

23. G. Sandí, K. A. Carrado, R. E. Winans, J. R. Brenner, and G. W. Zajac. Designer Carbons Templatized by Pillared Clays: Lithium Secondary Battery Anodes. Mater. Res. Soc. Symp. Proc., Macroporous and Microporous Materials 431, 39-44 (1996).
24. R. E. Winans, K. A. Carrado, P. Thiagarajan, G. Sandí, J. E. Hunt, and G. W. Zajac. *Designer Carbons as Potential Anodes for Lithium Secondary Batteries*. Proceedings, 22nd Biennial Conference on Carbon 1, 812, (1995). San Diego, CA, July 16-21, Invited paper.

## Presentations

1. G. Sandí. In Situ SAXS and GISAXS Studies of Polymeric Membranes for Energy Applications. Extended Abstract to XV International Materials Research Congress 2006 Synchrotron Radiation and Neutron Sources in Materials Research Symposium, Cancún, Mexico, August 20-24, 2006. Invited Talk.
2. L. G. Scanlon, P. B. Balbuena, Y. Zhang, G. Sandí, C. K. Back, W. A. Feld, J. Mack, M. Tsao, M. A. Rottmayer, J. L. Riepenhoff. *Investigation of Molecular Hydrogen Storage with Planar Aromatic Molecules via Computational Chemistry and Experimentation*. Extended Abstract, 6th International Symposium on New Materials for Electrochemical Systems, July 9-12, 2006, Montreal, Canada.
3. K. A. Carrado, G. Sandí, R. Kizilel, S. Seifert, and B. Lee. *Metal Nanoclusters in Clays and Polymer-Clay Nanocomposites Films*. Abstract to the Joint Meeting of the Clay Minerals Society & the Groupe Francais de Argiles, Oleron, France, June 3-7, 2006.
4. G. Sandí, C-K. Back, H. Joachin, N. de Souza, J. Prakash. *QENS Studies of the Hydrogen Storage Capacity of Novel Sepiolite-Derived Carbonaceous Materials*. Extended Abstract to the 209th Meeting of the Electrochemical Society, Denver. Colorado, May 7-12, 2006. Invited Talk.
5. C-K. Back, J. Prakash, and G. Sandí. *Understanding Hydrogen Storage in Pd-doped Carbon Nanostructures*. Extended Abstract to the 209th Meeting of the Electrochemical Society, Denver. Colorado, May 7-12, 2006. Invited Talk.
6. G. Sandí. *Novel Carbon Nonofibers as Potential Candidates for Hydrogen Storage*. ECS Chicago Local Section Meeting. Lisle, IL, November 10, 2005. Invited Talk.
7. C-K Back, J. Prakash, and G. Sandí. *Pd-doped Carbon as Hydrogen Storage Material*. Workshop on Electrochemical Conversion and Storage for Electric Vehicle Applications. Center for Electrochemical Science and Engineering, Illinois Institute of Technology, Chicago, IL, October 27, 2005.

8. L. G. Scanlon, P. B. Balbuena, Y. Zhang, G. Sandí, C. Back, W. A. Feld, J. Mack, and M. Rottmayer. *Investigation of Corannulene for Molecular Hydrogen Storage via Computational Chemistry and Experimentation*. Extended Abstract to the 206<sup>th</sup> Meeting of the Electrochemical Society, Los Angeles, California, October 16-21, 2005.
9. L. G. Scanlon, P. B. Balbuena, Y. Zhang, G. Sandí, W. A. Feld, J. Mack, and M. A. Rottmayer. *Investigation of Corannulene as Molecular System for Hydrogen Storage*. Abstract to the 2005 AIChE Annual Meeting, Cincinnati, OH, October 30-4 November, 2005.
10. D. A. Grossie, W. A. Feld, L. G. Scanlon, G. Sandí, and Z. Wawrzak. *A Crystallographic Examination of Dilithium Phthalocyanine*. Abstract to the International Union of Crystallography 20th Congress of the International Union of Crystallography, Florence, Italy, August 23-31, 2005. Invited talk.
11. G. Sandí, K. A. Carrado, R. Kizilel, N. Castagnola, B. Lee, and S. Seifert. *In situ SAXS and GISAXS Studies of Polymer Nanocomposite Membranes for Energy Applications*. Abstract to the 229<sup>th</sup> American Chemical Society Meeting, San Diego, CA, Mar 13-17, 2005.
12. G. Sandí, R. Kizilel, K. A. Carrado, R. Fernández-Saavedra, and N. Castagnola. *Effect of the Silica Precursor on the Conductivity of Hectorite-Derived Polymer Nanocomposites*. Abstract to the Spanish Clay Society Scientific Meeting and General Assembly of the Spanish Clay Society, Madrid, Spain, Nov 15, 2004.
13. L. G. Scanlon and G. Sandí. *Investigation of Lithium-Corannulene Complex via AB Initio Calculations as Molecular System for Hydrogen Storage*. Extended Abstract to the 206<sup>th</sup> Meeting of the Electrochemical Society, Honolulu, Hawaii, October 3-8, 2004.
14. G. Sandí. *In Situ SAXS and GISAXS Studies of Polymeric Membranes for Energy Applications*. Invited talk at the Workshop on Membrane Science Using X-Ray Techniques. August 16-18, 2004. Advance Photon Source, Argonne National Laboratory.
15. G. Sandí, R. Kizilel, K. A. Carrado, and N. Castagnola. *Synthesis and Electrochemical Characterization of Novel Nanocomposite Polymeric Membranes*. Abstract to the 9th International Symposium on Polymer Electrolytes. Mragowo-Poland, August 22-27, 2004. Invited Talk.
16. L. G. Scanlon, L. R. Luente, W. A. Feld, G. Sandí, P. Balbuena, and A. Turner. *Lithium ion conducting channel as solid-state electrolyte for rechargeable lithium batteries*. Abstract to the 9th International Symposium on Polymer Electrolytes. Mragowo-Poland, August 22-27, 2004. Invited Talk.
17. G. Sandí. *Catalytic Nanocomposite Membranes*. Abstract to the DOE/NSF-EPSCoR Conference 2004. June 15-16, 2004, Argonne National Laboratory, Argonne, Illinois.

18. R. E. Winans, K. A. Carrado, G. Sandí, and N. A. Tomczyk. *Chemical transformation mechanisms*. Abstract to the U. S. Department of Energy 2004 DOE/BES Catalysis Program Contractors Meeting, Rockville, MD, May 23-26, 2004.
19. G. Sandí, H. Joachin, M. Castagnola, H. Yang, and J. Prakash. *Electrochemical Performance of Sepiolite-Derived Carbon Coated with Silver Nanoparticles*. Abstract to the 205th Electrochemical Society Meeting, San Antonio, Texas, May 9-14, 2004.
20. L. G. Scanlon, L. R. Lucente, W. A. Feld, G. Sandí, A. Turner, J. Scofield and B. Tsao. *Preparation of a Thin Film Solid State Electrochemical Cell with Li<sub>2</sub>Pc as the Electrolyte*. Abstract to the 205th Electrochemical Society Meeting, San Antonio, Texas, May 9-14, 2004.
21. R. E. Gerald II, K. J. Ruscic, D. N. Sears, R. J. Klingler, J. W. Rathke, and G. Sandí. *Ceramic Monolith Provides Unidirectional Ion-Conducting Channels for Lithium-Ion Cells*. Abstract to the 205th Electrochemical Society Meeting, San Antonio, Texas, May 9-14, 2004.
22. K. A. Carrado, R. Kizilel, G. Sandí, C. L. Marshall, and M. Castagnola. *Catalytic Nanocomposite Membranes for CO Abatement in Fuel Cell Applications*. Abstract to the 227th ACS National Meeting, Fuel Division. March 28-April 1, 2004, Anaheim, CA.
23. G. Sandí, R. Kizilel, R. Fernández-Saavedra, N. Castagnola, and K. A. Carrado. *Effect of the Silica Precursor on the Conductivity of Hectorite-Derived Nanocomposites*. Abstract to the 4th International Conference on Application of Conducting Polymers (ICCP-4). Como, Italy, February 18 - 20, 2004. Invited Talk
24. R. Kizilel, G. Sandí, H. Joachin, K. A. Carrado, V. H. Pérez-Luna. *Catalytic Membranes for CO Toleration in Fuel Cell Applications*. Abstract to the AIChE 2003 National Meeting, San Francisco, CA, November 16-21, 2003.
25. G. Sandí, N. Khalili, and I. Barsukov. *Physicochemical and Electrochemical Properties of Carbon-Based Materials Produced from Paper Mill Sludge*. Outlooks for Near Future Applications in Electrochemical Power Sources. Abstract to the NATO Carbon Advanced Research Workshop and Conference, Argonne National Laboratory, Argonne, IL, USA. October 19-24, 2003. Invited talk.
26. G. Sandí, R. Kizilel, H. Joachin, H. Yang, L. G. Scanlon, L. R. Lucente, W. A. Feld, P. B. Balbuena, S. Seifert, and A. Turner. *In Situ SAXS Studies of the Structural Changes of Dilithium Phthalocyanine (Li<sub>2</sub>Pc) Solid State Electrolyte Used in Rechargeable Systems*. Extended Abstract to the 204th Meeting of the Electrochemical Society, October 10-17, 2003, Orlando, Florida.
27. C. S. Johnson, K. Lauzze, N. Kanakaris, A. Kahaian, M. M. Thackeray, G. Sandí, S. A. Hackney, and R. O. Rigney. *Electrochemical Performance of Ni/Cu-Metallized & Carbon-Coated Graphites for Lithium Batteries*. NATO Carbon Advanced Research

Workshop and Conference, Argonne, Illinois, U.S.A., October 2003.

28. M. Villar, G. Sandí. *Synthesis and Characterization of Polymer Nanocomposites Used in Lithium-Ion Batteries*. Abstract to SACNAS 2003 National Conference, October 2-5, 2003, Albuquerque, NM.
29. R. Fernández-Saavedra, K. A. Carrado, E. Ruiz-Hitzky, G. Sandí, and C. L. Marshall. *Synthesis and Characterization of Unique Clays for Lithium Conductivity and Catalytic Applications*. Abstract to the Young Scientist Day, Argonne National Laboratory, Argonne, IL, July 23, 2003.
30. G. Sandí. *Development of New Anodes for Rechargeable Lithium Batteries and Their Characterization by Raman and NEXAFS Spectroscopy*. Extended Abstract to the 5th International Symposium on New Materials for Electrochemical Systems. July 6-11, 2003, Montréal, Canada. (Invited talk).
31. G. Sandí, H. Joachin, H. Yang, and J. Prakash. *Electrochemical Performance of Full Cells Prepared with Sepiolite-Derived Carbon and Lithium Transition Metal Oxide Positive Electrodes*. Extended Abstract to the 5th International Symposium on New Materials for Electrochemical Systems. July 6-11, 2003, Montréal, Canada.
32. G. Sandí, H. Yang, H. Joachin, K. A. Carrado, R. E. Winans, and J. Prakash. *Determination of the Hydrogen Storage Capacity of Novel Sepiolite-Derived Carbonaceous Materials*. Extended Abstract to the 5th International Symposium on New Materials for Electrochemical Systems. July 6-11, 2003, Montréal, Canada.
33. G. Sandí, Z. Gu, P. B. Balbuena. *Characterization of Polymeric Catalytic Membranes for Fuel Cell Applications*. Extended Abstract to the 5th International Symposium on New Materials for Electrochemical Systems. July 6-11, 2003, Montréal, Canada.
34. N. A. Tapan, B. Gurau, G. Sandí, and J. Prakash. *Investigation of Methanol Oxidation Electrokinetics on Pt:Ru Anode Catalyst*. Extended Abstract to the 5th International Symposium on New Materials for Electrochemical Systems. July 6-11, 2003, Montréal, Canada.
35. P. Moon, D. Stevens, G. Sandí, and R. Kizilel. *Computational Simulation of Lithium Ions Transport Through Polymer Nanocomposite Membranes*. Extended Abstract to the 5th International Symposium on New Materials for Electrochemical Systems. July 6-11, 2003, Montréal, Canada.
36. G. Sandí, R. Kizilel, H. Joachin, K. A. Carrado, Sönke Seifert, H. Yang, L. G. Scanlon, L. R. Lucente, and W. A. Feld. *In Situ SAXS Studies of the Structural Changes of Electrode Materials Used in Rechargeable Systems*. Invited Abstract to the 12th Users Meeting of the Advanced Photon Source, Argonne National Laboratory, Argonne, IL, April 28-May 1, 2003.

37. L. J. Smith, J.-M. Zanotti, G. Sandí, K. A. Carrado, D. L. Price, and M.-L. Saboungi. *Polymer Clay Nanocomposite Membrane Dynamics Characterization via combined NMR and Neutron Scattering Studies*. Extended Abstract to the 203th Meeting of the Electrochemical Society, April 27-May 2, 2003, Paris, France.
38. G. Sandí, R. Kizilel, H. Joachin, K. A Carrado, S. Seifert, L. J. Smith, and R. E. Gerald. *Characterization of Polymer Nanocomposites Used in Rechargeable Systems*. Abstract to the ACS Meeting, Division of Fuel Chemistry, March 23-28, 2003, New Orleans.
39. R. Kizilel, N. Khalili, G. Sandí, and R. J. Selman. *Application of SANS in Analysis of Fuel Cell Cathode Ion Exchange Membranes*. Abstract to the ACS Meeting, Division of Fuel Chemistry, March 23-28, 2003, New Orleans.
40. L. G. Scanlon, L. R. Luente, W. A. Feld, G. Sandí and A. Turner. *Composite Cathode with Li<sub>2</sub>Pc*. Extended Abstract to the 203th Meeting of the Electrochemical Society, April 27-May 2, 2003, Paris, France.
41. L. J. Smith, J-M. Zanotti, G. Sandí , K.A. Carrado, P. Porion, A. Delville, D. L. Price, and M-L. Saboungi. *Characterization of Polymer Clay Nanocomposite Electrolyte Motions via combined NMR and Neutron Scattering Studies*. Abstract to the MRS 2002 Fall Meeting, Boston, Massachusetts, December 2-6, 2002.
42. G. Sandí, R.E. Gerald, L. J. Smith, and M.-L. Saboungi. *NMR Characterization of Polymer Nanocomposites Used in Lithium Ion Cells*. Extended Abstract to the 202th Meeting of the Electrochemical Society, Salt Lake City, Utah, October 20-25, 2002.
43. P. Moon, G. Sandí, Deborah Stevens, and Riza Kizilel. *Computational Modeling of Polymer Nanocomposites*. Extended Abstract to the 202th Meeting of the Electrochemical Society, Salt Lake City, Utah, October 20-25, 2002.
44. P. J. Moon, D. Stevens, and G. Sandí. *Computational Modeling of Ionic Transport through Polymeric Membranes by Batch and Continuous Electrodialysis (ED)*. Abstract to the Society for Industrial and Applied Mathematics (SIAM), Philadelphia, PA, July 8-12, 2002.
45. K. C. Littrell, N. R. Khalili, M. Campbell, G. Sandí, and P. Thiagarajan. *Structural Characterization of Activated Carbon Adsorbents Prepared from Paper Mill Sludge*. Abstract to the American Conference on Neutron Scattering, Knoxville, TN, June 23-26, 2002.
46. Sandí, N. R. Khalili, W. Lu, and Jai Prakash. *Electrochemical Performance of Carbons Derived from Paper Mill Sludge*. Extended Abstract to the 11th International Meeting on Lithium Batteries, Monterey, CA, June 23-28, 2002.
47. G. Sandí, K. A. Carrado, H. Joachin, and W. Lu. *Polymer Nanocomposites for Lithium Batteries Applications*. Extended Abstract to the 11th International Meeting on Lithium

Batteries, Monterey, CA, June 23-28, 2002.

48. L. G. Scanlon, L. R. Luente, W. A. Feld, G. Sandí, R.E. Gerald, and R. Klingler. *Specific Conductivity as a Function of Temperature for Dilithium Phthalocyanine ( $Li_2Pc$ ) from -50°C to +100°C*. Extended Abstract to the 11th International Meeting on Lithium Batteries, Monterey, CA, June 23-28, 2002.
49. G. Sandí, K. A. Carrado, H. Joachin, R. Kizilel, and S. Seifert. *Temperature Dependence Studies of Polymer Nanocomposites Films*. Poster presented at The Third BESSRC Users Meeting. Argonne, IL, May 3, 2002.
50. R. Kizilel, N. R. Khalili, G. Sandí, K. Littrell, and R. J. Selman. *Microstructure Analysis of Fuel Cell Cathode/Ion Exchange Membranes Used in the Removal of Contaminants by SANS*. Abstract to the Aiche Conference, Illinois Institute of Technology, Chicago, IL, April 25, 2002.
51. G. Sandí, K. A. Carrado, H. Joachin, and W. Lu. *In Situ SAXS Studies of Polymer Nanocomposites*. Abstract to the International Workshop on Nanocomposites: Materials, Neutrons, and Data Interpretation. Argonne, IL, March 28-30, 2002.
52. R. Kizilel, N. R. Khalili, G. Sandí, K. Littrell, and R. Selman. *SANS Characterization of Fuel Cell Cathode/Ion Exchange Membranes Used on the Removal of Contaminants*. Abstract to the International Workshop on Nanocomposites: Materials, Neutrons, and Data Interpretation. Argonne, IL, March 28-30, 2002.
53. K. C. Littrell, N. R. Khalili, M. Campbell, G. Sandí, and P. Thiagarajan. *The Characterization Using SANS and BET of the Controlled Production of the Pore Structure in Catalytic Carbons Prepared from Paper-mill-Sludge*. Abstract to the International Workshop on Nanocomposites: Materials, Neutrons, and Data Interpretation. Argonne, IL, March 28-30, 2002.
54. R. E. Gerald, G. Sandí, C. S. Johnson, R. J. Klingler, J. W. Rathke. *Anisotropic Spin Interactions for  $^{7}Li$  Nuclei in Manganese Oxides: Prospects for In-Situ NMR Investigations in a Stationary Electrochemical/NMR Detector*. Argonne National Laboratory; Argonne, IL. Jan 31, 2001
55. R. Kizilel, N. R. Khalili, G. Sandí, and R. J. Selman. *Removal of Contaminants by Using a Fuel Cell Cathode/Ion Exchange Membrane*. Abstract to Eco-Informa 2001, Environmental Risks & the Global Community Strategies for Meeting the Challenges. Argonne National Laboratory, Argonne, IL, May 14-18, 2001.
56. M. Miaomiao, V. S. Donepudi, J. Prakash, G. Sandí, G. Wurtz, and G. P. Wiederrecht. *Electrodeposition of a Nano-Structured Ni-W Alloy and Characterization of Electrocatalytic Properties*. Extended Abstract to the 199th Meeting of the Electrochemical Society, San Francisco, CA, September 2-7, 2001.

57. G. Sandí. *Development of New Anodes for Rechargeable Lithium Batteries.* Extended Abstract to the 4th International Symposium on New Materials for Electrochemical Systems. Montreal, Canada, July 9-13, 2001. Invited Abstract.
58. A. V. Gelis, K. L. Nash, G. Sandí, A. H. Bond, M. P. Jensen, J. C. Sullivan, L. Rao. *Electrochemical Investigations of An(V, VI, VII) in Alkaline Media.* Los Alamos National Lab. 24th Actinide Separations Conference; Las Vegas, NV; May 22-25, 2000.
59. G. Sandí, C. S. Johnson, R. Gerald, K. A. Carrado, and R. E. Winans. *Electrochemical Performance of a Sepiolite-Derived Carbon/Lithiated Cathode.* Extended Abstract to the 198th Meeting of the Electrochemical Society, Phoenix, AZ, October 22-27, 2000.
60. R. A. Guidotti, F. W. Reinhardt, and G. Sandí. *Comparison of the Electrochemical Properties of Several Commercial Graphites with a Tempered Disordered Carbon.* Abstract for the 39th Power Sources Conference Cherry Hill, NJ, June 14-17, 2000.
61. G. Sandí, K. A. Carrado, R. E. Winans, S. Seifert, and C. S. Johnson. *Small Angle X-Ray Scattering Studies of Carbon Anodes Used in Lithium Rechargeable Batteries.* Abstract to the 219th ACS Meeting, March 26-31, 2000. San Francisco, CA.
62. G. Sandí, K. A. Carrado, R. E. Winans, S. Seifert, and C. S. Johnson. *Small Angle X-Ray Scattering Studies of Carbon Anodes Used in Lithium Rechargeable Batteries.* Preprint to the 219th ACS Meeting, Division of Fuel Chemistry, 45 (2), 370 (2000) March 26-31, 2000. San Francisco, CA.
63. G. Sandí, N. R. Khalili, K. Littrell, and P. Thiagarajan. *Pore Structure of Activated Carbons and Catalysts Produced from Paper Mill Sludge Using Small Angle Neutron Scattering.* Abstract to the 219th ACS Meeting, March 26-31, 2000. San Francisco, CA.
64. G. Sandí, N. R. Khalili, K. Littrell, and P. Thiagarajan. *Pore Structure of Activated Carbons and Catalysts Produced from Paper Mill Sludge Using Small Angle Neutron Scattering.* Preprint to the 219th ACS Meeting, Division of Fuel Chemistry, 45 (2), 383 (2000) March 26-31, 2000. San Francisco, CA.
65. A. V. Gelis, K. L. Nash, G. Sandí, A. H. Bond, M. P. Jensen, J. C. Sullivan, L. Rao, and A. Y. Garnov. *Electrochemical Investigations of An(V, VI, VII) in Alkaline Media.* Abstract to the 219th ACS Meeting, March 26-31, 2000. San Francisco, CA.
66. J. F. Schneider, G. Sandí, H. J. O'Neill, L. Schiff, E. Vickers, and H. Elbaum, *Lewisite Purity Determination by Coulometric Titration.* PITTCON 2000, March 12-17, 2000. New Orleans, LA.
67. L. G. Scanlon and G. Sandí. *Influence of Corannulene's Curved Carbon Lattice (C<sub>20</sub>H<sub>10</sub>) on Lithium Intercalation.* Abstract to NanoSpace 2000, The International Conference on Integrated Nano/Microtechnology for Space Applications. January 23-28, 2000, Houston, Texas.

68. R. E. Winans, S. Seifert, P. Thiagarajan, and G. Sandí, *Characterization of Carbons and Coals by Small Angle X-Ray Scattering*. Activated Carbon and Nanotube Workshop. Lexington, KY, July 7-9, 1999. Invited talk.
69. H. Jain, N. R. Khalili, H. Arastoopour, and G. Sandí. *NO<sub>x</sub> Removal Using a Novel Carbon Based Catalyst Produced from Paper Mill Sludge*. AICHE Annual Meeting, October 31 to November 5, 1999, Dallas, TX.
70. R. E. Gerald II, G. Sandí, R. J. Klingler, and J. W. Rathke. *NMR Spectroscopy and Imaging of an Electrochemical Cell with a Carbon Working Electrode*. Abstract of the 41th Rocky Mountain Conference on Analytical Chemistry, Denver, CO July 30-August 5, 1999.
71. G. Sandí, R. E. Gerald II, and L. G. Scanlon. *Molecular Orbital and Li-7 NMR Investigation of the Influence of Curved Lattices in Lithium Intercalated Carbon Anodes*. Extended Abstract 3rd International Symposium on New Materials for Electrochemical Systems, pp. 161-162. July 4-8, 1999, Montréal, Canada.
72. M. Campbell, N. R. Khalili, H. Arastoopour, and G. Sandí. *Impact of Chemical Activation on Surface Properties of Activated Carbons Produced from Paper Mill Sludge*. Abstract of the 1999 AIChE Chicago Section Conference, Illinois Institute of Technology, April 14, 1999, Chicago, IL.
73. G. Sandí, K. A. Carrado, R. E. Winans, C. S. Johnson and K. D. Kepler. *Carbons for Lithium Ion Cells Prepared Using Sepiolite as an Inorganic Template*. Extended Abstracts. 194th Meeting of the Electrochemical Society, November 1-6, 1998, Boston, Abstract No. 85.
74. G. Sandí, R. E. Gerald, R. J. Klingler, J. W. Rathke, K. A. Carrado, and R. E. Winans. *Studies of Electrolyte Penetration in Carbon Anodes by NMR Techniques*. Extended Abstracts. 194th Meeting of the Electrochemical Society, November 1-6, 1998, Boston, MA. Abstract No. 154.
75. R. E. Gerald II, R. J. Klingler, J. W. Rathke, G. Sandí, and K. Woelk. *In Situ NMR Analysis of Charge Carriers in Polymer Electrolytes*. 40th Rocky Mountain Conference on Analytical Chemistry, Denver, CO July 26-31, 1998.
76. R. E. Gerald II, R. J. Klingler, J. W. Rathke, G. Sandí, and K. Woelk. *Toroid Cavity NMR Detector: Application to Electrochemical Systems*. 40th Rocky Mountain Conference on Analytical Chemistry, Denver, CO July 26-31, 1998.
77. G. Sandí, R. E. Gerald II, L. G. Scanlon, K. A. Carrado, and R. E. Winans. *Computational, Electrochemical and <sup>7</sup>Li NMR Studies of Lithiated Disordered Carbon Electrodes in Lithium Ion Cells*. Mater. Res. Soc. Abstracts. 1997 Fall Meeting, p. 560.

78. G. Sandí, P. Thiyagarajan, R. E. Winans, and K. A. Carrado. *Small Angle Neutron and X-Ray Scattering Studies of Carbons Prepared Using Inorganic Templates*. Abstract, 214th ACS Meeting, Division of Fuel Chemistry, Las Vegas, NV, September 8-12.
79. G. Sandí, P. Thiyagarajan, R. E. Winans, and K. A. Carrado. *Small Angle Neutron and X-Ray Scattering Studies of Carbons Prepared Using Inorganic Templates*. Pre-prints, 214th ACS Meeting, Division of Fuel Chemistry 42 (4), 854 (1997). Las Vegas, NV, September 8-12.
80. M. Pam, N. R. Khalili, and G. Sandí. *Determination of the Surface Fractal Dimensions of Activated and Disordered Carbons Using Gas and Liquid Phase Isotherm Data*. Pre-prints, 214th ACS Meeting, Division of Fuel Chemistry 42 (4), 859 (1997). Las Vegas, NV, September 8-12, 1997.
81. M. Pam, N. R. Khalili, and G. Sandí. *Determination of the Surface Fractal Dimensions of Activated and Disordered Carbons Using Gas and Liquid Phase Isotherm Data*. Abstract, 214th ACS Meeting, Division of Fuel Chemistry. Las Vegas, NV, September 8-12, 1997.
82. G. Sandí, R. E. Winans, C. Johnson, P. Stair, and C. Lin. *Intercalation Compounds Used as Anodes in Lithium Secondary Batteries*. Abstract 861, p.1061, The Electrochemical Society Extended Abstracts, Vol 96-2, San Antonio, TX, October 6-11, 1996.
83. G. Sandí, R. E. Winans and K. A. Carrado. *Synthesis and Characterization of New Carbon Electrodes for Secondary Lithium Batteries*. The Electrochemical Society Extended Abstracts, Vol 95-1, Reno Nevada, May 95. Paper No. 27.
84. G. Sandí, R. E. Winans and K. A. Carrado. *Synthesis and Characterization of New Carbonaceous Materials Utilized in Lithium Ion Batteries*. American Chemical Society Meeting, August 1995, Chicago, IL. Paper No. 40.
85. P. Vanýsek and G. Sandí. The Electrochemical Society Extended Abstracts, Vol 94-2, Miami Beach, Fl, October 94. Paper No 587.
86. G. Sandí and P. Vanýsek., Pittsburgh Conference, Chicago, IL, February 1994. Paper No 208.
87. G. Sandí. *Impedance and Voltammetric Studies of Film Nanostructures: Polyaniline Conductive Films and Polycarbonate Insulator Membranes*; Ph.D. Dissertation, April 1994.
88. G. Sandí and P. Vanýsek. Graduate Students Symposium of the Electrochemical Society, Milwaukee, Wisconsin, April, 1993.
89. G. Sandí and P. Vanýsek, ACS Great Lakes Meeting, Milwaukee, Wisconsin, June 1992. Paper No 38.

90. G. Sandí and P. Vanysek,. The Electrochemical Society Extended Abstracts, Vol 92-1, Saint Louis, Missouri, May 1992. Paper No 45.
91. G. Sandí. *Determination of Cd, Pb, Zn, Cu, Fe, Mn, and Cr in Sea Water from the Coral Reefs of the Cahuita National Park, Costa Rica, via Anodic Stripping Voltammetry and Atomic Absorption*. Lic. Thesis. University of Costa Rica, San José, July, 1990.