

Surface Energy Analyzer Bulletin (2014-1)

The inverse Gas Chromatography - Surface Energy Analyzer (iGC-SEA) system is the new generation of the inverse Gas Chromatography. It is specially designed to determine the surface energy heterogeneity but nevertheless suitable to measure different surface and bulk properties of solid materials such as Adsorption isotherms, Heat of sorption, Glass Transition Temperature, Solubility Parameters and so on. The below papers represent recent peer-reviewed articles utilizing vapor sorption or inverse gas chromatography.

Minerals

N Arsalan, Sujeewa S Palayandoda, D J Burnett, J Buiting, Q Nguyen, **"Surface energy characterization of sandstone rocks"**, *Journal of Physics and Chemistry of Solid*, 74:1069-1077 (2013).

N Arsalan, Sujeewa S Palayangoda, D J Burnett, J Buiting, Q Nguyen, **"Surface energy characterization of carbonate rocks"**, *Journal of Physics and Chemistry of Solid*, 436: 139-147 (2013).

B Strzemięcka, A Voelkel, J Kolodziejek, **"Inverse Gas Chromatographic Characterization of Aluminosilicates as Fillers for Abrasive Articles"**, *Chromatographia* 75:353-360, (2012).

V Alipour Tabrizy, R Denoyel, AA Hamouda, **"Characterization of wettability alteration of calcite, quartz and kaolinite: Surface energy analysis"**, *Colloids and Surfaces A: Physicochem. Eng., Aspects*, 384:98-108 (2011).

N. Cordeiro, J Silva, C Gomes, F Rocha, **"Bentonite from Porto Santo Island, Madeira archipelago: surface**

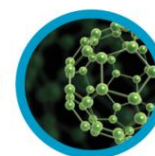
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Y Cheol Yang, P Ran Yoon, **"Examination of the surface properties of kaolonites by inverse gas chromatography dispersive properties"**, *Korean. Chemical Eng.* 24 (I), 165-169 (2007).

A K Helmy, E A Ferreiro, S G de Bussetti, **"The surface energy of kaolinite"**, *Colloid Polym Science*, 283: 225-228 (2004).

A Voelkel, A Krysztafkiewicz, **"Acid-base properties of silicas modified by organic compounds as determined by inverse gas chromatography"**, *Powder Technology* 95: 103-108 (1998).

L A G Aylmore, ID Sills, J P Quirk, **"Surface Area of Homoionic Illite and Montmorillonite clay minerals as measured by the sorption of nitrogen and carbon dioxide"**, *Clays and Clay Minerals*, Vol. 18, pp. 91-96. (1970).



Fibers, Hairs and Wood

R McMullen, D Laura, S Chen, D Koelmel, G Zhang, T Gillece, **“Determination of physiochemical properties of delipidized hair”**, *J. Cosmet Science*, 64 355-370 (September/October 2013).

N Cordeiro, M Ornelas, A Ashori, S Sheshmanu, H Norouzi, **“Investigation on the surface properties of chemically modified natural fibres using inverse gas chromatography”**, *Carbohydrates Polymers*, 87 (2012) 2367-2375 (2011).

A van Asten, N van Veenendaal, S Koster, **“Surface characterization of industrial fibres with inverse gas chromatography”**, *Journal of Chromatography*, A 888 (2000) 175-196 (2000).

R H Mills, W TY Tze, D J Gardner, A van Heiningen, **“Inverse Gas Chromatography for the determination of the dispersive surface free energy and acid-base**

interactions of a sheet molding compound. I. matrix material and glass”, *Wiley InterScience* DOI 10.1002/app.28389 (2 June 2008).

E Papirer, E Brendle, H Ballard, C Vergelati, **“Inverse gas chromatography investigation of the surface properties of cellulose”**, *J Adhesion Science Technology* Vol 14 No 3 pp 321-337 (2000).

PJC Chappell, D R Williams, **“Surface thermodynamics analysis of finishes on Kevlar 29 fabrics by inverse gas chromatography”**, *J Adhesion Science Technology*, Vol 4 No.1 pp. 7-16 (1990).

A S Gozdz, H-D Weigmann, **“Surface characterization of Intact Fibers by Inverse Gas Chromatography”**, *Journal of Applied Polymer Science*, Vol.29 3965-3979 (1984).

Pharmaceutical

S P Apte, **“Excipient- API interactions in dry powders inhalers”**, *J. Excipient and Food Chem.* 3(4) 2012.
D Parikh, **“An overview of the properties of pharmaceutical powders and their effects on the processibility”**, (2013).

MD Jones, P Young, D Traini, **“The use of inverse gas chromatography for the study of lactose and pharmaceutical materials used in dry powder inhalers”**, *Advanced Drug Delivery Reviews*, 64:285-293 (2012).

J F Gamble, M Leane, D Olusanmi, M Tobyn, E Supuk, J Khoo, M Naderi, **“Surface energy analysis as a tool to probe the surface energy characteristics of micronized materials – A comparison with inverse gas chromatography”**, *International Journal of Pharmaceutics*, 422:238-244 (2012).

S C Das, S R B Behara, J B Bulitta, D AV Morton, I Larson, P Stewart, **“Powder Strength Distributors for Understanding De-agglomeration of Lactose Powders”**, *Pharm Res* 29:2926-2935 (2012).

R Ho, A S Muresan, G A Hebbink, J YY Heng, **“Influence of fines on the surface energy heterogeneity of lactose for pulmonary drug delivery”**, *International Journal of Pharmaceutics* 388: 88-94 (2010).

R Surana, L Randall, A Pyne, N Murti Vemuri, R Suryanarayanan, **“Determination of glass transition temperature and *in Situ* study of the plasticizing effect of water by Inverse Gas Chromatography”**, *Pharmaceutical Research* Vol 20, No 10, (October 2003).





Polymers

D Gardner, M Blumentritt, A Kiziltas, EE Kiziltas, Y Peng, N Yildrin, **“Polymer Nanocomposites from the surface energy perspective: A critical review”**, *Rev. Adhesion Adhesives*, Vol. 1, No. 2 (2013).

SSM Ali, JYY Heng, AA Nikolaev, KE Waters, **“Introducing inverse gas chromatography as a method of determining the surface heterogeneity of minerals for flotation”**, *Powder Technology*, 249:373-377 (2013).

R H Mills, W TY Tze, D J Gardner, A van Heininge, **“Inverse gas chromatography for the determination of the dispersive surface free energy and acid-base interactions of a sheet molding compound. I. Matrix materials and glass”**, *Journal of Applied Polymer Science* DOI 10.1002/app (2008).

S Baoli, Z Qianru, J Lina, L Yuan, L Bin, **“Surface Lewis acid-base properties of polymers measured by inverse gas chromatography”**, *Journal of Chromatography A* 1149 390-393 (2007).

S Santa, MC Gutierrez, J Rubio, **“Interface adhesion in composites correlation between IGC measurements and mechanical testing results”** ICCM-12 Europe) Paper ID: 1037 (1999).

R Sanetra, B Kolarz, A Wlochowicz, **“The study of modified Poly(Styrene-co-Divinylbenzene) by Inverse Gaschromatographic Analysis”**, *Die Ange Makromolekulare Chemie*, 140:41-50 (Nr..2245) (1986).

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G DiPaola-Baranyi, J E Guillet, **“Estimations of Polymer Solubility Parameters by Gas Chromatography”**, *American Chemical Society*, Vol 11 No 1, pp 228-235 (Jan-Feb. 1978).

Nanomaterials

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E Diaz, S Ordoñez, A Vega, **“Adsorption of volatile organic compounds onto carbon nanotubes carbon nanofibres, and high-surface-area graphites”**, *Journal of Colloid and Interface Science* 305 7-6 (2007).

E Paprier, E Brendle, F Ozil, H Balard, **“Comparison of the surface properties of graphite, carbon black and fullerene samples, measured by inverse gas chromatography”**, *Carbon* 37 1265-1274 (1999).

M Maciejewska, A Krzywania-Kaliszewska, M Zaborski, **“Surface properties of calcium oxide nanopowders**

grafted with unsaturated carboxylic acids studied with inverse gas chromatography”, *Journal of Chromatography JCA* 12-936 (2012).

Q Shen, M Mezgebe, F Li, J-Q Dong, **“Liquids adsorption behaviour and surface properties of polyanilines doped by lignosulfonate-modified carbon nanotubes”**, *Colloids and Surfaces A: Phyciochem. Eng. Aspects* 390 212-215 (2011).

D J Gardner, M Blumentritt, A Kiziltas, E E Kiziltas, Y Peng, N Yaildrim, **“Polymer Nanocomposites from the Surface Energy Perspective: A Critical Review”**, *Rev. Adhesion Adhesives*, Vol 1, No 2, DOI: 10.7569/RAA.2013.097309 (April 2013).





Upcoming Conferences:

Adhesion Society: San Diego, CA, USA.

February 23-24, 2014; Exhibitor and Presenter

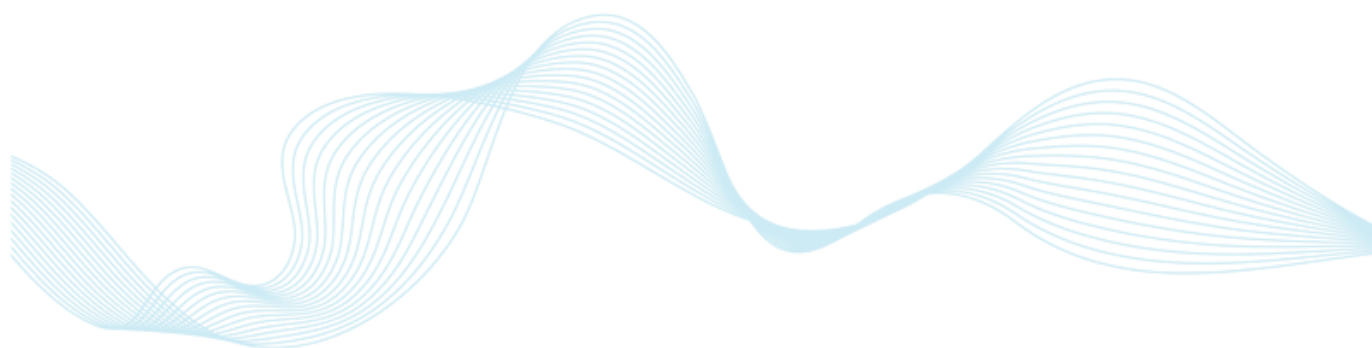
JEC Europe 2014 Composite Show: Paris, France

March 11-13, 2014; Exhibitor

SMS Training:

SMSNA Office: Email Science@smsna.com for details.

SMSUK Office: Email Science@smsuk.co.uk for details.



Head Office:

Surface Measurement Systems, Ltd
5 Wharfside, Rosemont Road
London HA0 4PE, UK

Tel: +44 (0)20 8795 9400

Fax: +44 (0)20 8795 9401

Email: sales@smsuk.co.uk

United States Office:

Surface Measurement Systems, Ltd, NA
2125 28th Street SW, Suite I
Allentown PA, 18103, USA

Tel: +1 610 798 8299

Fax: +1 610 798 0334

Email: sales@smsna.com

