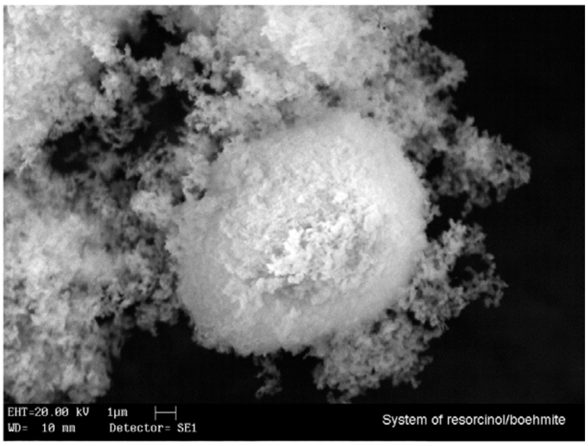
The growth of organic nanoparticles defined by boehmite-resorcinol complexation

MARTINA FRANKE

Department of Soil Science, University of Trier, D-54296 Trier, Germany (fran5101@uni-trier.de)

Boehmite (γ-AlOOH) can form complexes with resorcinol (m-dihydroxybenzene) in which a growth of organic nanoparticles was observed. The organic coatings from the resorcinol-boehmite complex showed very compact flakes in structure and covered the entire fine mineral surface. In contrast, boehmite comprised of orthorhomic structures. The complex was synthesized by adsorption in a gas-solid phase at 50 °C in the presence of atmospheric pressure for a period of 60 days in total darkness. In this study, a comparative structure analysis was conducted from boehmite and resorcinol-boehmite complex by using methods of VNIR spectroradiometry, Fourier transform infrared (FTIR) spectrometry, energy dispersive X-ray spectrometry (EDX), scanning electron microscopy (SEM), and atomic force microscopy (AFM).

AFM images in contact mode showed compact cross-linked structures of organic nanoparticles and nanopores. The growth of organic nanoparticles was reduced in the presence of stabilizing mechanisms which occurred by the complexation. However, the polymerization of resorcinol was more intensive and located on the upper surfaces. The m-hydroxy groups of resorcinol showed favorable reactions to this complexation. It was clear that stereochemical effects were of significant relevance in defining the interactions between resorcinol and boehmite.



[1] Franke M. (2002) diploma thesis, University of Trier, 187.

Self-organizing maps for targeting within regional geochemical data sets

S.J. FRASER[1]*, B.L. DICKSON[2], P. KOWALCZYK[3] AND J.H. HODGKINSON[1]

[1]CSIRO MDU, PO Box 883, Kenmore, 4069 Australia (*correspondence: Stephen.Fraser@csiro.au) (Jane.Hodgkinson@csiro.au)

[2]Dickson Research Pty. Ltd., 47 Amiens St, Gladesville, 2111 Australia (Bruce.Dickson@optusnet.com.au)

[3]PK Geophysics Inc., 14717 16A Ave, Surrey, BC, Canada V4A 5M6 (mining.geophysics@gmail.com)

We report on various self-organizing maps (SOM) [1] visualization approaches that can be used to identify targets, trends and relationships in regional geochemical data sets. These visualization approaches include (1) use of quantization errors, (2) K-means clustering of SOM-derived nodes, (3) 'cluster-normalized' element anomaly (spatial) maps, (4) component plots, and (5) cross-plots of selected elements based on SOM-node values.

While SOM can be used to assist in the analysis and visualization of regional geochemical data, it is the spatial context and coherence of the samples that SOM identifies, which are critical for their assessment. Spatial plots of sample-locations, which are colour-coded by either their K-means node cluster colour or by the magnitude of their quantization-error, can be used to rapidly assess the significance of samples identified as anomalous.

Examples will be presented from a study involving analysis of stream and lake sediment analytical data over part of the Quesnellia Terrane of central British Columbia [2]. The input dataset consists of some 15, 000 samples, each with 42 elemental values that were extracted from levelled and imputed elemental grids [3].

[1] Kohonen (2001) *Self-Organizing Maps*, 3rd edn, Springer-Verlag, Berlin, p.501. [2] Fraser & Hodgkinson (2009) *Geoscience BC Report 2009–14*. [3] Barnett & Williams (2009) *Geoscience BC Report 2009–003*.