

Division VI – Chemistry & the Environment Project 2004-015

Environmental colloids: behaviour, structure and characterisation



1. INTRODUCTION

This new book, to be published in early 2006 by Wiley, will present critical reviews of the state-of-the-art knowledge of environmental colloids. The book will include reviews of our current understanding of the structure, role and behaviour of environmental colloids and particles. Organic, inorganic and biological environmental colloids and their aggregates (sizes > ca. 1 nm) will be discussed. The nature of the environmental colloids and their behaviour, including trace element transport will be also be addressed. In addition, there will be substantial critical assessment of the techniques employed for the sampling, size fractionation and characterisation of colloids and particles. Particular attention will be paid to non-perturbing and quantitative approaches that take account of particle heterogeneity and polydispersity. Most of the focus will be the recent developments in the techniques that have occurred over the last 10 years. For instance, chapters on relatively standard techniques such as filtration, electron microscopy (EM) and field-flow fractionation (FFF) will primarily review more novel aspects of the techniques such as the use and development of cross flow filtration and the coupling of novel analytical techniques with FFF. In addition, there will be a discussion of the novel methods that have been developed and applied over this time frame, including capillary electrophoresis (CE), laser induced breakdown detection (LIBD), fluorescence correlation spectroscopy (FCS), atomic force microscopy (AFM), confocal laser scanning microscopy and SPLITT.

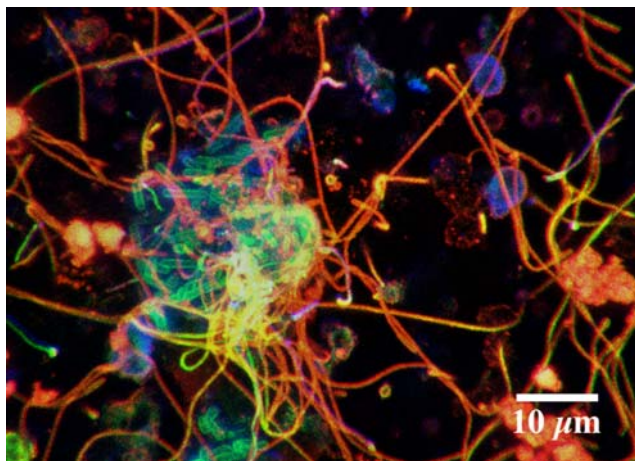
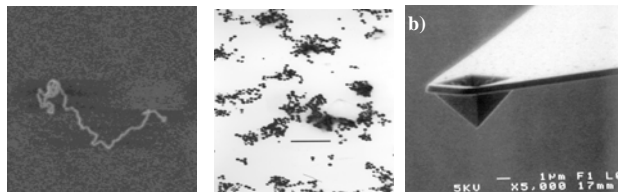


Fig. 1. An LSM micrograph which illustrates the application of microbeads to assess the sorption and penetration of bacterial microcolony EPS and determination of charge and permeability. Taken from the chapter prepared by J.R. Lawrence and T.R. Neu.

2. BOOK CHAPTERS

- Ch. 1: Environmental colloids: current knowledge and future developments, J.R. Lead and K.J. Wilkinson
- Ch. 2: Important properties of the major environmental colloids, M. Filella
- Ch. 3: Colloid-trace element interactions in aquatic systems, F. Doucet, P. Santschi, J.R. Lead
- Ch. 4: Ultrafiltration techniques and their application to sampling aquatic colloids, L. Guo, P. Santschi
- Ch. 5: Environmental applications of Field-flow fractionation and SPLITT, M. Hasselhov, F. von der Kammer, R. Beckett
- Ch. 6: Modern electrophoretic techniques for the characterization of organic environmental colloids, P. Schmitt-Kopplin, J. Junkers
- Ch. 7: Strategies and advances in the characterization of aquatic colloids by electron microscopy, D. Mavrocordatos, D. Perret, G.G. Leppard
- Ch. 8: Force microscopy and force measurements of environmental colloids, E. Balnois, G. Papastavrou, K.J. Wilkinson
- Ch. 9: Laser scanning microscopy of environmental particles, J. Lawrence, T. Neu
- Ch. 10: Study of environmental systems by fluorescence correlation spectroscopy, N. Fatin-Rouge, J. Buffle
- Ch. 11: Laser induced breakdown detection of environmental colloids, J.I. Kim, C. Walther
- Ch. 12: Probing environmental particles with x-rays J.F. Gaillard



3. FURTHER INFORMATION

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• Project Description on IUPAC Web Site:
www.iupac.org/projects/2004/2004-015-1-600.html