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FAST MOVING FRONTS - 2010

March 2010

(Commentary added in Mar. 2010 for Nov. 2009 entry.)

PDF

Chad A. Mirkin talks with *ScienceWatch.com* and answers a few questions about this month's Fast Moving Fronts paper in the field of Materials Science.

Article: Chemically tailorable colloidal particles from infinite coordination polymers
Authors: Oh, M;**Mirkin, CA**
Journal: NATURE, 438 (7068): 651-654, DEC 1 2005
Addresses: Northwestern Univ, Dept Chem, 2145 Sheridan Rd, Evanston, IL 60208 USA.
Northwestern Univ, Dept Chem, Evanston, IL 60208 USA.
Northwestern Univ, Inst Nanotechnol, Evanston, IL 60208 USA.

SW: Why do you think your paper is highly cited? Does it describe a new discovery, methodology, or synthesis of knowledge?

It reports on a fundamentally new class of nanoparticle-based infinite coordination polymers (ICP). These structures can be tailored to have all sorts of interesting and useful physical and chemical properties. Parameters include size, shape, a bifunctional linking ligand, and metal nodes. It describes a versatile synthetic strategy for realizing a new class of nanostructures.

SW: Would you summarize the significance of your paper in layman's terms?

Nanoparticles are being designed and used for all sorts of applications, including medical diagnostic and imaging probes, intracellular gene regulation agents, catalysts, dyes, and electronic components.

This manuscript describes a way of making a new class of nanoparticles with properties that can be tailored through a choice of readily accessible ligand and metal ion building blocks. The strategy involves controlled polymerization, where the reaction is stopped before the particles become macroscopic in size.

"Some of the structures may lead to new medical diagnostic and therapeutic capabilities and, in the process, substantially improve healthcare."

SW: How did you become involved in this research and were any particular problems encountered along the way?

We have been working in the field of nanotechnology for the past two decades and realized that most nanoparticle compositions are based upon the reduction of metal ions or the reaction between metal cations and elemental anions. This limits the tailorability of the resulting nanostructures.

Ideally, synthesizing such particles from molecular building blocks should provide even greater tailorability and dramatically expand the scope of application. We had to devise a way of controlling the polymerization reaction and we did so by controlling the kinetics of particle formation and termination through the use of binary solvent systems

SW: Where do you see your research leading in the future?

These structures have promise in many areas, especially in catalysis and the life sciences. We will focus our short-term efforts in these areas.

SW: Do you foresee any social or political implications for your research?

Some of the structures may lead to new medical diagnostic and therapeutic capabilities and, in the process, substantially improve healthcare.

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KEYWORDS: ORGANIC NANOPARTICLES; OPTICAL-PROPERTIES; COMPLEXES; CATALYSIS; NANOCRYSTALS; REDUCTION; CRYSTAL; SILVER; DNA.

Additional information:

- Read a past *ScienceWatch.com* Newsletter Interview (Jan. 2010) from Chad A. Mirkin.

PDF