11 New Name = New Thing

In the journal *Inorganic Chemistry* this week there is a cover article titled, "$Mn^{II/III}$ and $Ce^{III/IV}$ Units Supported on an Octahedral Molecular Nanoparticle of CeO_2", written by Sayak Das Gupta, Annaliese E. Thuijs, Ethan G. Fisher, Khalil A. Abboud and George Christou, published February in *Inorg. Chem.* 2022, 61, 17, 6392–6402

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> The artwork shows the three clusters described in this paper incorporated into a peaceful dawn at the Pyramids of Giza. The clusters are described as ultrasmall nanoparticles of CeO_2 in molecular form, so-called "molecular nanoparticles", on which small magnetic Mn_x units are attached; they can therefore be considered molecular analogues of magnetic species on nanoparticle supports. The cluster cores all have an octahedral or bioctahedral geometry, providing the link to the shapes of the Great Pyramids.

The odd thing about this is the mention of "molecular nanoparticle." What they mean, and what the artwork caption says, is "cluster." Clusters are fairly large collections of some molecule that could be smaller, but isn't. We find them all over biology, we've known of clusters in chemistry for about 150 years. So why the new term for them?

Self aggrandizement. It's the only reason. We have nothing in the abstract saying why the new term for clusters, just a reference to "and are thus ultrasmall ceria nanoparticles in molecular form." Well, that's almost the definition of a molecule; take out the "nanoparticles" and they are describing a molecule. I think they name them this to get into the nanopartlcle press.

I was massively disappointed when I saw my first demonstration of nanoparticle synthesis: it looked just like any normal synthesis, but the powder was described as being made of nanoparticles. The physical behavior of them was exactly the same as any powder. And the utility of nanoparticles, like buckyballs, the first nanoparticle, is still zero. They just aren't good for anything.

Buckyballs, carbon balls that look like soccer balls, were found in soot in the early 1990's, and were heralded as the new thing in chemistry. Well, after forty years, they have been extensively tested, and they have been found to behave just like soot.

The nano-press is extensive now, and the utility is still zero. It's zero because they are molecules, and we know how they behave. Putting the "nano" in front of a known word doesn't change them

to something new. It just gets them funded more easily by evidently gullible Government grant reviewers.

UPDATE 28 June 2022:

Many years ago I found the pamphlet by Marx and Engles introducing the ideas of communism, *Manifest der kommunistischen Partei* (1848, commonly called the *Communist Manifesto*). I found it very difficult to read because they had redefined so many words. It wasn't that those words needed to be changed, like middle-class and entrepreneurs, they did it, I thought, because they needed to confuse the reader enough that the reader would believe the malarky they proposed. The bad connotations to the term "manifesto" come from the way this book abuses language.

I saw this again when I read my roommate's book, *Science and Health with Key to the Scriptures*, by Mary Baker Eddy (1910). She does the same thing, redefine words that already have very common meanings.

And then I saw it again, in a far more challenging context: articles published regularly in the *Journal of Chemical Education*. It was done regularly, I think, because these authors really had nothing new to say but wanted or needed to publish something, so they defined new words for old things and sold them as new goods. Like "POGIL," *Process Oriented Guided Inquiry Learning*, instead of the old word, group worksheets. This bothered me a lot, and this is when I realized that chemical education professors really had nothing new to say. And it's when I stopped reading *J. Chem. Ed*. (there was actually a second good reason I stopped, when I noticed that no new pedagogy proposed and evaluated *ever* fared worse than those to which it was compared, meaning the evaluators were rigging the contest).

This was backed up in a very small and mostly anecdotal way when I looked at the grades in my CHEM 1210 courses over two decades by major. The major which did most poorly: geological education majors. And it wasn't a small gap, it was massive. Other education majors also did fairly poorly, but most at least passed the class. Since this realization I actively try to encourage chemical education majors to move to one of the chemistry major disciplines, like professional chemistry or biochemistry, where the job opportunities are far broader and frankly, the expectation for performance it higher as well. Perhaps education majors are there because they consider it an easy and unchallenging path. Unchallenging it is. Education majors have almost guaranteed low-pay high-workload jobs waiting for them: educating your kids. It's a sucky career option, but an easy one. K-12 schools are in such high need of teachers they will hire anyone.

Then I saw this this morning in which a professor, Lyell Asher of Lewis and Clark College, explains rather clearly how this started, and why it persists. It's long, 80 minutes, but packed with good information.

https://www.youtube.com/embed/0hybqg81n-M

I have never been trained in teaching. And yet I'm quite good at teaching undergraduate chemists. How could that happen? Because I was trained in *thinking*. My Ph.D. professor, Paul Lindahl at Texas A&M University, College Station, made a point of having us evaluate the claims authors made in scientific paper, and of proving what we said and thought, of being open-minded to better explanations than those we already have. This is how university professors are trained, not by indoctrination, but by it's direct opposite, thinking. And for university professors, training in thinking is enough. No professor in UVU's chemistry department is hired on education credentials, we hire based on education *skills*. And we are a strong department because of it.

https://edschools.org This needs a whole different blog post. Dang!

> “Many university based school leadership programs are engaged in a “race to the bottom,” in which they compete for students by lowering standards and offering faster and less demanding degrees.
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> Credentials have come to overshadow competence.
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> Executive Summary, *Educating School Leaders*, Education Schools Project, March 2005 http://edschools.org/pdf/ESfinal313.pdf

> “A majority of teacher education graduates are prepared in university-based programs that suffer from low admission and graduation standards.
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> Executive Summary, *Educating School Teachers*, Education Schools Project, Sept. 2006 http://edschools.org/pdf/Educating_Teachers_Exec_Summ.pdf

In other words, anyone gets in, everyone graduates. Or, education-degree diploma mill.

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