

Early Discovery of Buckminsterfullerene Narrowly Missed

To the Editor:

The awarding of the Nobel Prize in Chemistry to Professors Curl, Smalley, and Kroto for their 1985 discovery of Buckminsterfullerene and other fullerenes prompts me to comment upon how narrowly this discovery was missed by another Nobel Laureate, Henry Moissan, during the 1890s. Like many of the present fullerene researchers, Moissan was interested in the polymerization of carbon at high temperature to form soots, graphite, diamond, etc. His equipment included both the electric furnaces for which he is well-known and cold plate/flame soot deposition devices.

The presence of fullerenes in soot from a limited-oxygen acetylene flame was established by Gerhardt et al. in 1987 (*Chemical Physics Letters* **117** (4) June 19, 1987, pp. 306–310, "Polyhedral Carbon Ions in Hydrocarbon Flames"). The solubility of C₆₀ in benzene and the use of this solvent to extract fullerenes from soot was revealed by Krätschmer et al. in 1990 (*Nature*, **347**, Sept. 27, 1990, pp. 354–358, "Solid C₆₀: A New Form of Carbon").

In his book, *The Electric Furnace* (English edition published in 1904 by Edward Arnold, London), Moissan describes (on page 40) the deposition of soot from an acetylene flame upon a chilled copper surface. Moissan found the soot to contain a small amount of volatile carbon compounds. The sample he describes was purified by extraction with benzene, alcohol, and ether. The extract with benzene almost certainly contained Buckminsterfullerene and is described as containing carbon-based compounds. It is a pity that the color of the extract is not given by Moissan as this would go far to confirm whether he, unknowingly or not, extracted C₆₀ from the sample of soot.

The failure of Moissan to detect and characterize the fullerenes is obviously a failure of theoretical insight at that early date. However, this researcher, using preparatory techniques very similar to today's, came very close to extracting C₆₀, if he did not, in fact, accomplish this without recognizing the significance of his extracts other than as a route to purify the remaining carbon soot.

Brian Melody

Affiliation withheld at author's request

Materials Chemistry: Subarea or Semantics?

To the Editor:

With all due respect to its author, was the topic of the "Materials Matters" column in the December 1996 issue of *MRS Bulletin* entitled, "What is Materials Chemistry?" really sufficiently substantive to merit two pages in your publication? At best, it seemed to play with the semantics and nomenclature of the fields involved while jumping on the "add 'materials' to my name" bandwagon of a few years ago. At worst, it does a mild disservice to the materials field and to chemistry by trying (I think unsuccessfully) to erect didactic divisions between fields and subfields that are supposed to strongly overlap and cooperate. To assign the micro world to chemistry and the macro world to materials science with physics relegated to property measurement is a bit simplistic. And metallurgy (of both the micro and macro varieties) was omitted entirely. This kind of categorical hair splitting may be a practical necessity when constructing a syllabus and curriculum in chemistry, but it is an exercise in label justification for me. Chemistry and chemists (and the two are not always synonymous) have been vital to the development of materials science and modern advanced materials in one way or another from day one (yes even when it was mostly mechanical engineering). Practitioners may label themselves by their disciplinary training or their research activities (usually not the same in our field) and it doesn't matter much which one they choose. The notion that there is an "emergence of materials chemistry as an interdiscipline" carved out of the old interdiscipline of materials science just because of chemistry's pervasive role seems not only a bit overblown but topologically impossible. (The opinions of the author are his own and do not necessarily reflect those of his employer or other affiliated organizations.)

Elton N. Kaufmann

Argonne National Laboratory

Response:

I appreciate the opportunity to respond to Dr. Elton Kaufmann's "Letter to the Editor" that expressed disagreement with my article entitled "What is Materials Chemistry?" published in *MRS Bulletin* (Vol. 21, No. 12, pp. 5–6). I personally believe that exchanges of academic ideas

are the enzyme to accelerate developments of scientific research. I would like to give some explanation of my article as follows:

1. In the past 10 years, more and more chemists are steering their research toward advanced materials. Meanwhile, materials scientists have applied more and more new chemistry methods and concepts to materials study. This has led to the *formation of materials chemistry as a new subarea*. Can it be doubted? If yes, my discussion can end here. If not, please read the following sections.

2. Obviously, it is necessary to describe the contents, to define the category, and to establish new concepts of materials chemistry for both research and education. Even though much work still needs to be done, the article, at least, provides a clue toward a better understanding of the formation of materials chemistry.

3. To illustrate how materials chemistry works, I outlined the scheme, i.e., in Figure 2 in the article. Although it emphasized the importance of chemistry in materials science, it certainly did not mean to exclude the importance of physics and other fields. In fact, physics and other fields play a key role in materials research throughout. However, since my article focused on materials chemistry as a *subarea of either chemistry or materials science*, it was unnecessary to describe every aspect of materials science in the two pages.

I welcome more comments regarding this topic.

Xiaoyue Xiao
Tsinghua University

Book Withdrawn

To the Editor:

I write to inform you that Carol Nichols's *Structure and Bonding in Condensed Matter* (a review of which appeared in your December 1996 issue) was withdrawn from sale by Cambridge University Press in January 1996. Your readers may wish to consider Adrian Sutton's book *Electronic Structure of Materials* (Oxford University Press, 1993) as an alternative.

Peter-John Leone
Marketing Director &
Publishing Director
Cambridge University Press

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Editor, *MRS Bulletin***

Materials Research Society, 9800 McKnight Road,
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address, phone number, and e-mail if available.

See important 1997 MRS Fall Meeting abstract
deadline information on page 53.