

Identity Crisis

What a piece of work is man, argued Hamlet, before going on to describe the principal attributes of a materials scientist: noble in reason... infinite in faculties ... express and admirable, in action how like an angel, in apprehension how like a god! (Shakespeare's exclamation mark, not mine). While this list of attributes will, I am sure, resonate with all readers of *MRS Bulletin*, I am concerned that other citizens of the world do not associate them immediately with the profession of materials scientist. Indeed many people are not even *aware* of the profession. In part this is because we ourselves do not always claim this identity. Reflecting on my own development over the past 40 years, I have called myself a metallurgist, a scientist, a microscopist, a materials scientist, a materials engineer, a research manager, an engineering educator, or simply an engineer. Others of you will have used the terms ceramist, polymer scientist, chemist, (solid-state) physicist, and many more. (I also like to think of myself as a dilettante—which I consider a term of approbation rather than an insult, implying that I enjoy what I do.) No wonder Jo(e) Public is confused. If we do not know who we are, how can we expect the rest of the world to identify our profession?

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So who is a materials scientist, and what is materials science? Within our discipline this is relatively simple to define: A materials scientist is someone who joins the Materials Research Society, or who voluntarily becomes a member of an appropriate professional body (for instance, the Minerals, Metals & Materials Society in the United States; the Institute of Materials, Minerals & Mining in the United Kingdom; or the Société Française de Métallurgie et de Matériaux in France). Another self-definition has become evident to me recently in the U.K. context—choosing to submit one's research to the "Metallurgy and Materials" panel of the quinquennial Research Assessment Exercise (as opposed to the "Physics," "Chemistry," or "Mechanical Engineering" panels).

But what a varied, and interesting, lot we are. We might be working on metals,



semiconductors, polymers, freshly-synthesized nanomaterials or on leather, wood, food, or pharmaceuticals. We publish our work in journals aimed at medics, astrophysicists, physical chemists, or consumer electronics buffs. Four of the five most popular journals among U.K. submissions to the Metallurgy and Materials panel have the word "physics" in their title! Only six of the top 20 journals used by these researchers contain the word "materials." How can we be surprised that nobody knows about materials science when, for all the best of motives, we emphasize our contributions to other disciplines? We are so good at collaboration, so quick to appreciate the potential significance of our work, and so naturally interdisciplinary that we forget that we have our own discipline. But we do often find ourselves running those collaborations—we seem to be disproportionately successful at managing other scientists and engineers.

Let us now approach the identity issue from the other end—from the perspective of our great-grandchildren, looking back at us. What will they think were the successes of materials science? Will they identify the driving down of the dielectric layer thickness in electronic devices, or the driving up of the temperature at which we can use turbine blades or maintain superconductivity or the clever ways we developed the process to synthesize optical materials nearly as good as opal? Or is it more likely they will wish to cele-

brate the "plastic chips" which enable the latest washing machine to clean a load of clothes using (and heating) only one cupful of water? I do not know how this works so cannot be more precise, but since the machine uses much less energy and much less water I would guess that our descendants (whose chance of surviving and not having to fight wars over water supplies would have been enhanced) might be very grateful. In a similar vein, self-cleaning products (windows, cars, and—already—clothes) will make a big contribution to lowering energy and water needs. I do hope that the inventors responsible for these developments, as well as those who gave us light-emitting-diode lighting, will call themselves materials scientists, or perhaps materials engineers, and not physicists or polymer chemists or chemical engineers. As a 21st century Shakespeare might have had Hamlet say "To proclaim yourself a materials scientist or not, that is the question." Claim your identity, materials scientists, or you will become—to complete Hamlet's soliloquy—not "the paragon of animals" but "this quintessence of dust."*

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* "What a piece of work is a man! How noble in reason! How infinite in faculty! In form and moving how express and admirable! In action how like an angel! In apprehension how like a god! The beauty of the world! The paragon of animals! And yet, to me, what is this quintessence of dust?" (*Hamlet*, Act II, Sc. ii.)