Rustum Roy: PR Is a Better System Than Peer Review

What would you do if you were a materials scientist in academia who had come up with an innovation that just might put your university in a position to profit from the growing synthetic diamond industry, already a $500 million-a-year business? Submit a paper to *Science* or *Nature*, then wait for peer review to recognize your ingenuity? Not if you're Rustum Roy. Roy, the much-published, controversial, knife-tongued founder of Pennsylvania State University's Materials Research Laboratory (MRL), has criticized researchers who hype their results and journalists who buy their claims uncritically. But last week Roy and his colleagues played a few media games of their own, putting out a press release and hiring a room in Washington's National Press Club to publicize what they think is a breakthrough in synthesizing diamond more easily, efficiently, and in a wider variety of shapes and sizes than can be done with conventional methods.

Not that Roy and his two MRL research associates completely eschewed the ordinary process of publishing scientific results. They submitted separate, though related, manuscripts to *Science* and *Nature*. But Roy held the press conference and distributed the manuscripts to reporters long before the editors at the two journals had a chance to review them—a practice widely known to reduce a researcher's chances of publication in the elite scientific press.

But Roy doesn't think that's such a huge loss. He claims peer review is a terrible process: too slow and too "leaky," allowing peer reviewers to gain research advantages unfairly. "I have absolutely no faith in peer review," he told the assembled press. Roy told the press conference he chose the mass media as a way of getting his results out because they're faster than peer review—and because they're a more effective way of drawing the attention of corporate executives. Although Roy says, "I'm against hyping things," he claims his behavior in this case doesn't constitute hype, because his discovery is the real thing. This is "no cold fusion," he said.

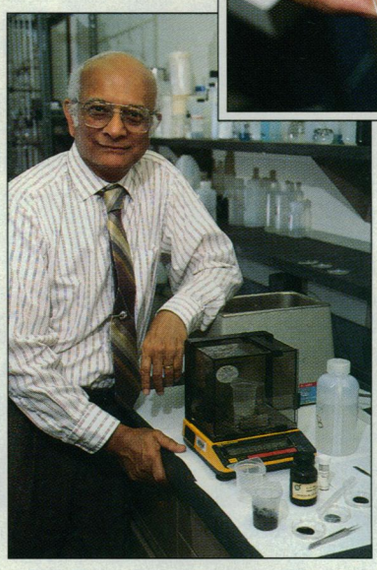
Roy's research peers express puzzlement about his end-run around peer review. Noting that Roy's research record is sufficient to secure him plenty of respect, one researcher, who insisted on anonymity, said: "I honestly don't know why he is doing this. This is an interesting idea but he should have just sent it off for publication"—and peer review. William Banholzer of General Electric, a leader in the world's synthetic diamond industry and expert at PR to boot, added that the Penn State group "may have wanted to make as big a splash as they can because it might attract students and funding agencies."

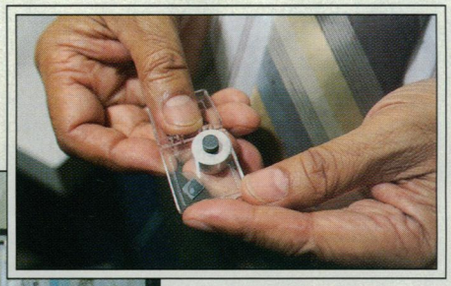
Easy to lose in the bemusement over Roy's unorthodox ways is what could be a new way of making synthetic diamond. Other synthetic diamond researchers who have seen the manuscripts consider the work interesting and potentially important. In its simplest variant, the Penn State researchers combine carbon-rich powders with nickel powder (which acts as a catalyst for diamond formation), spread the mix atop a crystalline surface that can serve as a growth template for diamond, then shower the preparation with hydrogen plasma (known to encourage diamond growth at the expense of other carbon structures) while baking it all afternoon in an oven at about 1000 C. During the process, atoms in the inexpensive carbon powders rearrange into diamond's more pristine and valuable geometry. The technique should be able to transform "virtually any form of solid carbon" into diamond of arbitrary shapes and sizes, the researchers claim.

This process would certainly seem to be a promising alternative to the most commonly used industrial processes for making synthetic diamond, which require vast pressures and temperatures and produce only small diamond particles, used mostly for cutting tools. And most cutting-edge research on synthetic diamond making focuses on converting gaseous (not solid) carbon sources, such as methane, into thin films of diamond using a family of techniques called chemical vapor deposition (CVD). The use of a solid carbon source in a low-pressure technique, and the option of making larger, thicker diamond objects, renders the technique "radically innovative," Roy claims.

But other researchers aren't persuaded that Roy's technique is all that new. Crystallume, a Menlo Park, California, firm, has several patents for techniques that produce "diamond ceramics" by subjecting a preshaped aggregate of diamond particles to CVD conditions. Even Roy's more basic speculation that the Penn State synthesis might be occurring by a novel solid-to-solid transformation, which has never been seen at the low pressures of the technique, has its doubters. J. Michael Pinneo of Crystallume and others suspect instead that carbon from the solid is probably first vaporizing into gaseous fragments and then redepositing as diamond onto the solid's surface. That would make it "a variant on a lot of previous [CVD] research," says John Angus of Case Western Reserve University, one of the field's most respected practitioners. Still, "if he can convert large pieces of porous graphite into diamond, this would be positive," Angus adds.

The kinds of expert judgments Angus and Pinneo were offering are precisely what constitutes peer review. In considering what inspired the Penn State diamond makers to short-circuit that process, clues might be found in market analyses that project synthetic diamond to become a multibillion-dollar business by the end of this decade, a fact Roy pointed out in the press conference. The MRL, which coordinates a multicompany diamond research consortium, is well aware of the financial stakes—and the zeal of their worldwide competition. Hence the PR-for-peer-review switch, which Roy and MRL director Russel Messier say was blessed by the university's provost and by patent attorneys. "We [at universities] have not been efficient at converting research into patented, protected technologies," says Messier. "This [PR campaign] is forging new policy at Penn State for protecting important results."





PAT LITTLE

Not cold fusion? Rustum Roy models a new method for making diamonds he claims is far superior to existing methods.

MRL's self promotion has generated results: *The Wall Street Journal* wrote a piece based on Roy's press release, as did several magazines including *Science* and *Chemical & Engineering News*. Only time and scrutiny by other researchers will decide if the science Roy so eagerly publicized last week will prove as innovative as his PR tactics.

–Ivan Amato