At a given area in a watershed, strontium isotope ratios are very stable and show little seasonal or temporal variation. Kennedy and his colleagues identified 11 different geologic signatures for 18 regions of the Connecticut River and its tributaries in central and southern Vermont, an area that has been the focus of Atlantic salmon restoration efforts for more than 30 years. Then they looked at the strontium isotope ratios in backbone tissue of juvenile salmon and in otoliths—bits of bony material near the brain known as "ear stones"—of adult salmon. The otoliths become a record of the fish's environment.

Kennedy said, "The chemical information is laid down in the otoliths on a daily basis, and they can be 'read' much like tree rings, but on an even finer scale."

Announcement of Element 118 Retracted

The team of Lawrence Berkeley National Laboratory scientists that announced two years ago the observation of what appeared to be element 118—the heaviest undiscovered transuranic element at the time—has retracted its original paper after several confirmation experiments failed to reproduce the results.

In a brief statement submitted to *Physical Review Letters*, the same publication in which the original results were announced, the research team stated, "In 1999, we reported the synthesis of element 118 in the (lead-krypton) reaction based upon the observation of three decay chains, each consisting of an implanted heavy atom and six sequential high-energy alpha decays, correlated in time and position. Prompted by the absence of similar decay chains in subsequent experiments, we (along with independent experts) re-analyzed the primary data files from our 1999 experiments. Based on these re-analyses, we conclude that the three reported chains are not in the 1999 data. We retract our published claim for the synthesis of element 118."

In addition to the confirmation tests at Berkeley, scientists at the GSI laboratory in Germany and the RIKEN laboratory in Japan were unable to duplicate the original reported results.

Micro-Organisms Process Gold Oxides into Metallic Gold

In research related to pollution cleanup, a team of University of Massachusetts microbiologists led by researcher Derek

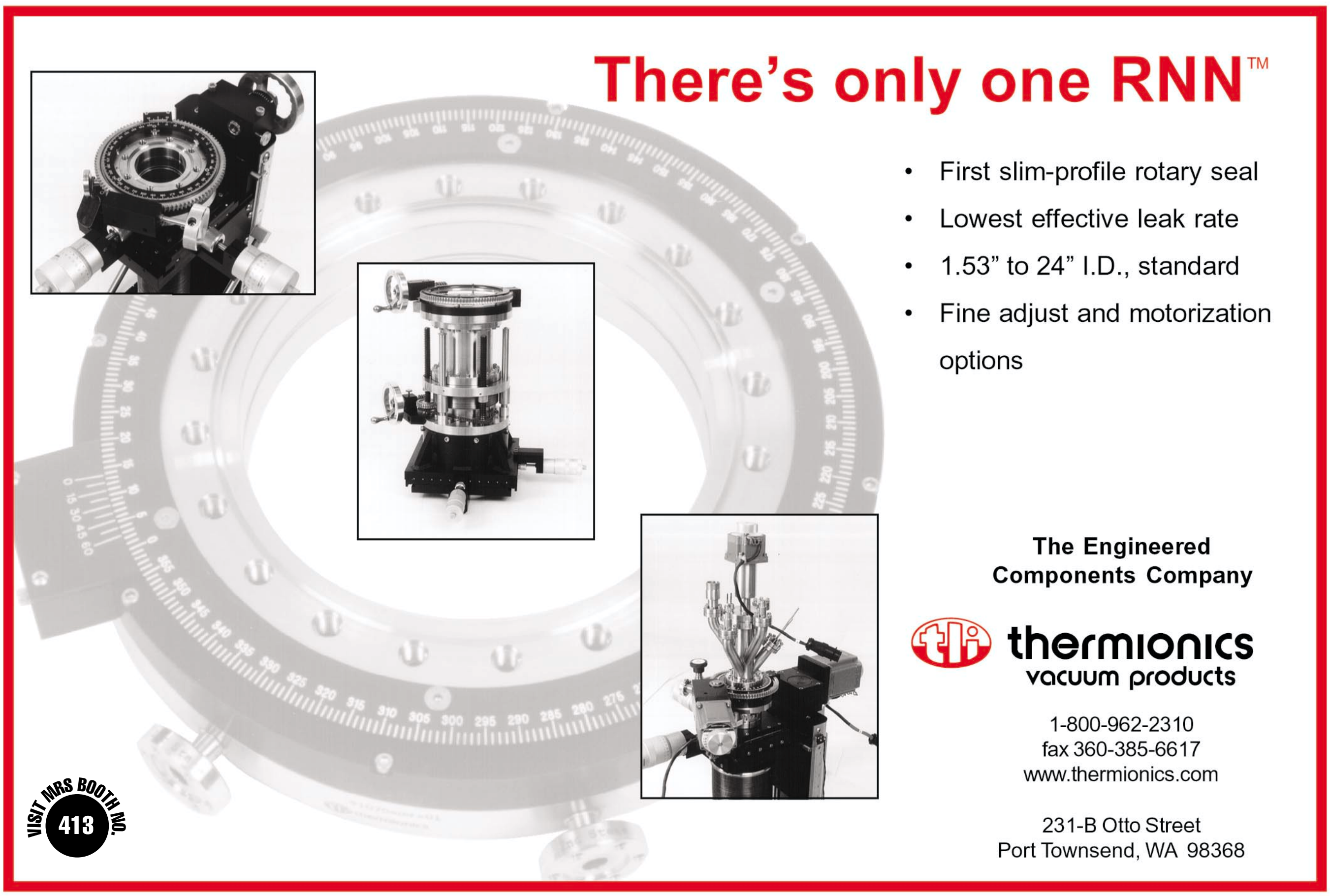
Review Articles

The following review articles relevant to materials research have been published recently.

"Structure Shape and Stability of Nanometric-Sized Particles," by M. José Yacamán, J.A. Ascencio, H.B. Liu, and J. Gardea-Torresdey, *Journal of Vacuum Science and Technology B* **19** (4) (2001) p. 1091.

"Review of the Filtered Vacuum Arc Process and Materials Deposition," by P.J. Martin and A. Bendavid, *Thin Sold Films* **394** (1–2) (2001) p. 1.

"The Energy Balance at Substrate Surfaces during Plasma Processing," H. Kersten, H. Deutsch, H. Steffen, G. M. W. Kroesen, and R. Hippler, *Vacuum* **63** (3) (2001) p. 385.



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Lovley has discovered that microbes convert gold from an oxidized, dissolved form to an insoluble, solid form. Lovley said that while dissolved gold is toxic to most life forms, it and many other heavy metals are not toxic to a group of microbes called extremophiles. His research team studied whether extremophiles may be responsible for deposits of solid gold in places that now are below the surface of the Earth. His research team said this would explain how the metal came to be in two different forms in very different environments. Gold is found as a solid in deposits close to the Earth's crust, and in solution, often far removed from gold-ore deposits.

Lovley's laboratory has previously presented evidence that iron-reducing microorganisms are involved in the formation of uranium ores, changing uranium to a form that precipitates out of water. Massive accumulations of magnetite created by iron-reducing microbes during the Precambrian period of the Earth's development now are important deposits of iron ore, according to Lovley.

In the laboratory, postdoctoral research associate Kazem Kashefi and graduate students Jason M. Tor and Kelly P. Nevin studied dissolved gold in an oxidized form in an environment similar to that found in a hydrothermal vent, where dissolved gold can sometimes be found. As they suspected, the microbes rapidly converted the gold into an insoluble, metal form. They reported in the July issue of the journal *Applied and Environmental Microbiology*, that essentially, the microbes had eaten the solution, and left behind the sought-out by-product.

Lovley said, "There's a significant amount of gold found in solution in some thermal springs, and hydrothermal vents on the ocean floor. The problem is that the gold is extremely diluted, so only a [small] amount is dispersed in a very large volume of water."

"There are waste streams from gold processing where this same reduction process might work on a larger scale, but the goal of this study was to offer an explanation of how gold deposits are formed, more than it was to produce any profitable or useful application on a larger scale," he said. □

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