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Looking Ahead

Assessing the Nanotech Revolution

The United States government is investing an enormous amount of money in nanotechnology—more than any other country but Japan. This year, spending on nanotech will exceed $1 billion. These vast public funds flow into an unproven field—one that already enjoys substantial private investment—because Congress believes nanotech innovation will boost the economy, create jobs, and keep America competitive.

Many members of Congress clearly also believe that the development of advanced nanotechnology will profoundly change and improve the world. The latter point was repeatedly made by legislators discussing the Nanotechnology Research and Development Act in 2003, which was frequently endorsed in revolutionary terms: "We now stand at the threshold of an age in which materials and devices can be fashioned atom by atom," said a Democrat on the floor of the House of Representatives. Nanotechnology is a "'bottom-up' approach much like building a sculpture atom by atom and molecule by molecule instead of cutting it from a larger rock," said a Republican Senator. They were describing an area of advanced nanotechnology called *molecular manufacturing*. Clearly, Congress desired at least some federal funding to be spent on pursuing molecular manufacturing, but instead virtually all of it has gone into far more mundane nanoscale research. The research the government is presently funding will lead to useful progress in several fields, but molecular manufacturing could lead to revolutionary breakthroughs in production, medicine, aerospace, and more.

Now the National Research Council, the operating arm of the National Academies, the most prestigious scientific body in the United States, is conducting a comprehensive review of the federal government's nanotech program. The committee conducting the review hosted a workshop on molecular manufacturing in February, in which it heard presentations from critics vocally skeptical about molecular manufacturing and supporters convinced that its development is inevitable. Members of the committee and their staff are to be lauded for thoughtfully engaging the questions of molecular manufacturing during the workshop, for it is in this area that their expert scrutiny is sorely needed—to determine the possibilities, to moderate excessive claims, and to explore potential ethical and social dilemmas. (As one of the reviewers put it, if the committee doesn't look into molecular manufacturing, "we can all go home!")

A preliminary report from the committee is expected in June 2005, with a final report to follow early next year. It is our hope that the committee will offer a clear analysis of the technical potential of molecular manufacturing, and a clear recommendation on whether federal nanotechnology funds should be allocated toward theoretical and practical research into molecular manufacturing. A clear statement from the committee will help resolve the discrepancy between what Congress expects and what federal funds in fact support.