NASA must reinvest in nanotechnology research, according to new paper

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The United States may lose its leadership role in space to other countries unless it makes research and development funding and processes—especially in nanotechnology—a renewed and urgent priority, according to a new paper from Rice University's Baker Institute for Public Policy.

The paper, "NASA's Relationship with Nanotechnology: Past, Present and Future Challenges," investigates how NASA has both guided and defunded cutting-edge nanotechnology development since 1996 at its own research facilities and in its collaborations with university scientists and laboratories. The research was conducted by a team at Rice that included Baker Institute science and technology policy fellow Kirstin Matthews, current Rice graduate student Kenneth Evans and former graduate students Padraig Moloney and Brent Carey. The paper sheds light on a broad field that holds tremendous potential for improving space flight by reducing the weight of spacecraft and developing smaller and more accurate sensors.

This area of research, however, saw a dramatic cutback from 2004 to 2007, when NASA reduced annual nanotechnology R&D expenditures from $47 million to $20 million. NASA is the only U.S. federal agency to scale back investment in this area, the authors found, and it's part of an overall funding trend at NASA. From 2003 to 2010, while the total federal science research budget remained steady between $60 billion and $65 billion (in constant 2012 dollars), NASA's research appropriations decreased more than 75 percent, from $6.62 billion to $1.55 billion.

The authors argue that the agency should restructure, refocus and strengthen its R&D programs.

"The United States currently lacks a national space policy that ensures the continuity of research and programs that build on existing capabilities to explore space, and that has defined steps for human and robotic exploration of low-Earth orbit, the moon and Mars," Matthews said. "With Congress and the president wrestling over the budget each year, it is vital that NASA present a clear plan for science and technology R&D that is linked to all aspects of the agency. This includes connecting R&D, with nanotechnology as a lead area, to applications related to the agency's missions."

The authors said that to effectively engage in new technology R&D, NASA should strengthen its research capacity and expertise by encouraging high-risk, high-reward projects to help support and shape the future of U.S. space exploration

"Failure to make these changes, especially in a political climate of flat or reduced funding, poses substantial risk that the United States will lose its leadership role in space to othercountries—most notably China, Germany, France, Japan and Israel—that make more effective use of their R&D investments," Matthews said.

More information: "NASA's Relationship with Nanotechnology: Past, Present and Future Challenges" paper: www.bakerinstitute.org/policyreport54

Provided by Rice University