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Nano Research Has Strong Multidisciplinary Roots, Study Shows

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Other Research Fields Are Also Highly Multidisciplinary.

Atlanta (September 7, 2009) —The burgeoning research fields of nanoscience and nanotechnology are commonly thought to be highly multidisciplinary because they draw on many areas of science and technology to make important advances.

Research reported in the September issue of the journal *Nature Nanotechnology* found that nanoscience and nanotechnology indeed are highly multidisciplinary—but not much more so than other modern disciplines such as medicine or electrical engineering that also draw on multiple areas of science and technology.



Figure shows the position of nanoscience and nanotechnology over a base map of science. Each node is one of 175 subject categories in the SCI database, and the size of the node is proportional to the number of nanopapers published.
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With \$1.6 billion scheduled to be invested in nano-related research during 2010, assessing the multidisciplinary nature of the field could be important to policy-makers, research managers, technology-transfer officers and others responsible for managing the investment and creating a supportive environment for it.

"Research in nanoscience and nanotechnology is not just a collection of isolated 'stove pipes' drawing knowledge from one narrow discipline, but rather is quite interdisciplinary," said Alan Porter, co-author of the paper and a professor emeritus in the Schools of Industrial and Systems Engineering and Public Policy at the Georgia Institute of Technology. "We found that research in any one category of nanoscience and nanotechnology tends to cite research in many other categories."

The study was sponsored by the National Science Foundation through the Center for Nanotechnology in Society at Arizona State University.



Figure shows the fields of science cited by nanotechnology papers.
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Porter and collaborator Jan Youtie, manager of policy services in Georgia Tech's Enterprise Innovation Institute, analyzed abstracts from more than 30,000 papers with "nano" themes that were published between January and July of 2008. They found that although materials science and chemistry dominated the papers, fields as diverse as clinical medicine, biomedical sciences and physics also contributed.

These "nanopapers" studied by the researchers appeared in more than 6,000 journals that were part of a database known as the Science Citation Index (SCI). The researchers found nanopapers in 151 of SCI's 175 subject categories, with 52 of the categories containing more than 100 such papers.

To explore how well knowledge was integrated across the disciplines, the researchers also studied the journal articles that were cited in the nanopapers. They found more than one million cited references, a mean of 22 per paper.

