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**A learner-centered high school curriculum based on nano- and environmental science entitled
“Welcome to Nanoscience: Interdisciplinary Environmental Explorations, Grades 9-12”**

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Welcome to Nanoscience is a 183-page secondary school science curriculum (also known as Nano2Earth, pronounced “nano-to-Earth”) that brings nanoscale science and technology to life in the context of Earth and environmental sciences. It is the first high school curriculum of its type, and is currently printed and distributed by NSTA Press (National Science and Teachers Association). Nano2Earth combines nanoscale science and technology with a vital environmental science issue, toxic metal and bacterial groundwater pollution. The curriculum transcends traditional scientific knowledge and processes presented in high school chemistry, biology, geoscience, and environmental science classes today. Nevertheless, every aspect of the Nano2Earth curriculum addresses one or more of the National Science Education Standards (NSES).

Welcome to Nanoscience is divided into two parts. Part I consists of five chapters, with Chapters 1-3 providing a nanoscience primer for high school teachers not familiar with this field. Chapter 4 describes how Nano2Earth addresses the NSES, and Chapter 5 describes the curriculum. Part II contains the curriculum itself, consisting of five hands-on lessons (Introduction to Nanotechnology, Introduction to Water Pollution, Microbe-Mineral Interactions, Investigation of Bacterial Transport in Groundwater, and Nanoforces in Nature) requiring minimal resources and easily obtained, inexpensive equipment and supplies. In each lesson, the nanoscience and nanotechnology of the subject is emphasized, from mineral nanoparticles, to reactive nanofilms on mineral surfaces, to nanoforces between aquifer mineral components and pathogenic bacteria. Teachers may use the entire curriculum or pick and choose among its several parts depending on their preferred emphasis, the course level, and available time. The curriculum is meant to be flexible, with numerous entry and exit points. A teacher can use this resource for one day, or for several weeks of class.

The Nano2Earth curriculum development originated in 2001 as an outreach project in the Department of Geosciences at Virginia Tech supported as part of an NSF Nanoscale Interdisciplinary Research Team (NIRT) grant (EAR-0103053). Over the next five years, Nano2Earth developed as a collaborative project conceived, written, and classroom-tested by five high school science teachers from southwest Virginia, four professors from Virginia Tech, and several PhD candidates. When a full test version was completed in 2006, Nano2Earth was distributed privately, at no cost, to any high school teacher who was interested in using the curriculum. Funding for the final development of the project resumed in 2008 as part of our participation in the national Center for the Environmental Implications of NanoTechnology (CEINT) supported by the NSF and the Environmental Protection Agency (EPA) under NSF Cooperative Agreement EF-0830093. That funding continues to the present time.