## SECTION B - PROJECT SUMMARY

**NanoSense: The Basic Sense behind Nanoscience**

*Intellectual Merit.* The revolution nanoscience brings to diverse areas of human endeavor—including medicine, industry, and environmental management—requires a commensurate response in the educational community to increase students' understanding of core concepts in the field. Whereas numerous nanoscale science and engineering programs exist at the undergraduate and graduate levels, there is a strong need for nanoscience education in earlier grades, both to increase students' scientific literacy and to prepare them for further study in the field.

This proposal focuses on promoting the learning of science concepts that account for nanoscale phenomena. We will work closely with chemists, physicists, educators, and nanoscientists to generate a set of nanoscience activities that build on previous efforts in our NSF-funded ChemSense project. These units will help students visualize physical, chemical, and biological principles that govern the behavior of particles on the nanoscopic scale. We will extend our curricular framework and create, classroom test, and disseminate 12 to 15 nanoscience activities to help students understand underlying principles, applications, and implications of nanoscale science. Some of these activities will be simple 1-day enrichment activities; others will be more highly developed units that span several class periods. The development and implementation of the ChemSense tools and activities will allow us to examine questions such as: Will students' understanding of nanoscience concepts improve over time? For example, will their understanding of the effects of size and the forces that apply at nano (versus macro) scales improve? Will students' ability to understand the applications of nanoscale engineering improve over time? Will they appreciate how technologies can alter their lives and society? Will they understand the interplay between science and technology? How do teachers use these tools and activities to support student discourse and understanding?

*Broader Impacts.* Including nanoscience education in the high school curriculum will do more than bring nanoscience concepts "down" to the high school level. It will also introduce a much-needed interdisciplinary element into the disjoint high school curriculum, since nanoscience brings together concepts from physics, chemistry, and biology, as well as related areas such as materials science and engineering. It would provide a way to revisit the core concepts from these domains and view them through a different lens. Nanoscience education can support understanding of the interconnections between traditional scientific domains, reflecting the "unity in nature" (Roco, 2003), and can provide compelling, real-world examples of science in action.

**100-Word Summary**

We will work closely with chemists, educators, and nanoscientists to generate nanoscience activities that build on our NSF-funded ChemSense project. These units will help students visualize physical, chemical, and biological principles that govern the behavior of particles on the nanoscopic scale. We will extend our curricular framework and create, classroom test, and disseminate 12 to 15 nanoscience activities to help students understand underlying principles, applications, and implications of nanoscale science. This work will introduce a much-needed interdisciplinary element into the disjoint high school curriculum and provide compelling, real-world examples of science in action.