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Research Experience for Teachers – New Jersey Institute of Technology

Module Topic:

The Secret Life of Nano-Particles – Why Size Does Matter

Background:

The topic of nano-technology is in the news frequently, but, students may not have a grasp of what it means to be that small. The first part of this lesson gives students a sense of what it means to be as small as micro and nano size, with size comparisons to larger objects. The second part explores why ultra small size matters to scientists and engineers with examples of the applications making use of it in various industries, including pharmaceuticals. This part will also discuss some of the problems encountered with working with very small particles.

Learning Objectives:

Students will explore the advantages and problems of the very small. Math skills include use of formulas and scientific notation. Computer skills include use of Excel or other spreadsheet software. Science and engineering skills include understanding units and measurement, physical and chemical properties, characterization of materials, and effects of energy on matter.

Standards and Indicators

Science 5.1, 5.3, 5.6, 5.7 of NJ Core Curriculum Content Standards

Materials

- Student handouts and worksheets, computers with Excel
- Hands-on activities or demos that can use meter sticks, micrometers, finely ground or powdered substances such as sugar, sand, flour, etc. to demonstrate properties of particles.

Approximate time required

1-5 days depending on the activities

Handouts: Worksheets

Classroom activity: Demo/Hands on activities comparing sizes of objects and flow rates of fine particles, worksheets with practice calculations, writing exercise/web site research, building an excel spreadsheet.

Homework: Worksheets/activities

Assessment: Rubric for grading

References: Bibliography to be included in module

