William R. Wiley

EMSL

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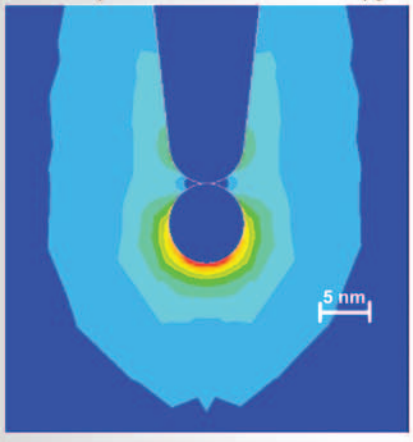
Near-field enhancement microscopy



Annual Report

Chemical Structure and Dynamics

October 2002

Pacific Northwest National Laboratory
Operated by Battelle for the U.S. Department of Energy

Cover Photo: ***Finite element method simulation of the atomic force microscopy (AFM) tip induced optical-field enhancement near a metallic nano-particle, a new approach for AFM-surface enhanced Raman microscopy (AFM-SERS). The illustration shows the distribution of an enhanced electric field in the vicinity of a nano-particle (dia.10nm) when approached from above by a silver AFM and exposed under the laser illumination with vertical polarization. By using a frequency-domain 3D finite element method to solve Maxwell's equations, CS&D researcher Miodrag Micic, Nicholas Klymyshyn, and H. Peter Lu simulated the electric field enhancement distribution as a function of the geometrical and optical parameters. Ongoing research suggests possible new approaches for enhancing the spatial and compositional resolution of the AMS-SERS imaging and microanalysis of samples on surfaces, as well as for nano-particles embedded under lipid membranes.***

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Annual Report

Chemical Structure and Dynamics

Steven D. Colson, Associate Director
R. E. Gephart, Program Manager
and the Staff of the Chemical Structure
and Dynamics Program

October 2002

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