



Smithsonian Center for Materials Research and Education

Topics in Conservation Science Lecture

NANOPOROUS GOLD LEAF – A TRADITIONAL METALLURGIST GOES HIGH-TECH



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Sometimes, modern technology really is influenced by historical craft! In this presentation, we will examine a new material – nanoporous gold (NPG). NPG is an ultraporous form of gold in which the pores are only tens of atoms wide. The material is formed by a chemical process called dealloying in which one element of a silver/gold alloy is selectively etched away, a technique related to the ancient surface finishing method known as depletion gilding. NPG is beginning to find applications in a wide variety of fields, from biosensors to fuel cells and the hydrogen economy.

One reason that nanoporous gold is beginning to be accepted as a viable “nanotechnology” is that a new form for this material has been developed: inexpensive free-standing membranes made from artists’ silver/gold leaf. Leaf is metal in the form of a thin sheet made by hammering a metal into a foil only a few thousand atoms thick, and we like to believe that ours is one of the first new, non-decorative, applications for this traditional fabrication method to appear in quite some time (millennia?!).

By using nanoporous gold as a case study, we will introduce modern trends in nanotechnology and materials science, examine cutting-edge applications for old materials, and forge links between modern technology and ancient craft.

April 28, 2005 at 10:45 am