

New Research and Development on End of Service Life Systems for Air-Purifying Respirators

Jay L. Snyder, Century III Supply & Services, Inc.

And

Lee A. Greenawald, National Institute for Occupational Safety and Health

Paper Presented by: Jay L. Snyder

Century III Supply & Services, Inc.

113 Snee Drive

Jefferson Hills, Pa 15025

centuryiii@hotmail.com 412-370-4168

The National Institute for Occupational Safety and Health (NIOSH) has researched the development of an end of service life (ESLI) for air-purifying respirator systems using nanotechnology. To date, a system based on photonic crystals and optical recognition has demonstrated good potential as a volatile organic chemical sensor system. Current research emphasis is ongoing to demonstrate greater versatility of this system. This will be accomplished by expanding the ESLI system to respond to inorganic chemical species. The current work is concentrating on the development of a sensor for hydrogen cyanide, a toxic industrial chemical. It is used extensively in the chemical industry as a chemical intermediate. In 2006 between 500 million and 1 billion pounds were produced in the US. It is also considered a chemical weapon. Given its significant toxicity, (Immediate Danger to Life or Health=50 parts per million (ppm)) an ESLI system would be highly desirable if air-purifying or powered air-purifying respirators (PAPR) were used for respiratory protection.

The current work involves producing a sol-gel silica pellet with sufficient pore size to have an acceptable response time. An agent that responds to hydrogen cyanide will be encapsulated in the matrix of the silica pellet. This will be advantageous by preventing leaching and keeping the agent stable. The goal is to produce a sensor with a response in the 2 ppm to 40 ppm range.

Another ongoing part of the ESLI program is to develop a demonstration system based on the photonic crystals and optical recognition system. This is being done to show feasibility in support of the new respirator standard development activities.