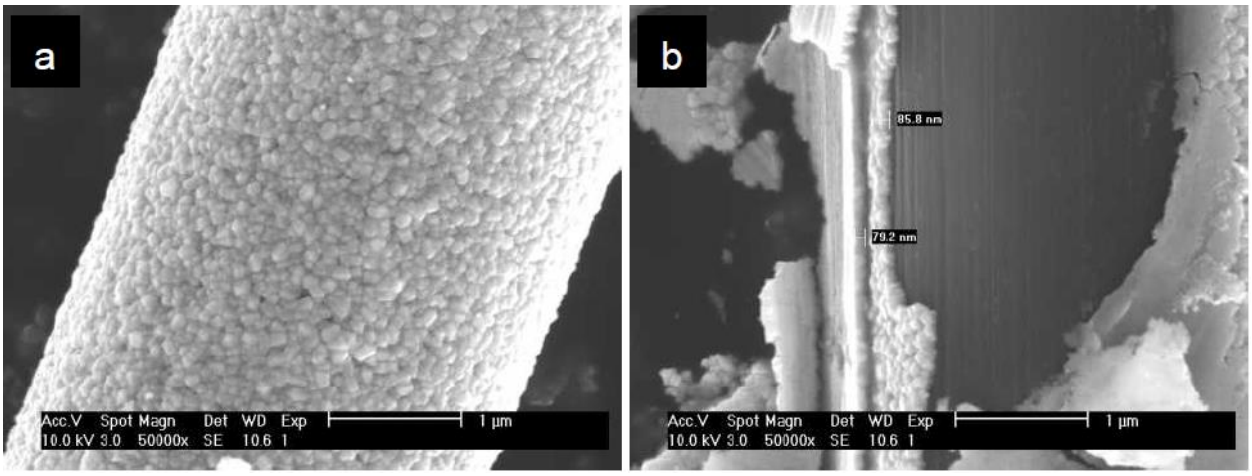
Low Cost Method for Metal Nano-Coating of Anisotropic Carbon Fibers

Aegis Technology has begun development on a novel class of nano-coating technology to synthesize thin, highly conductive metallic coatings for carbon fibers. Such nano-coatings significantly increase the extinction coefficient of the fibers and thus lead to a variety of military and industrial applications. This nano-coating technology is based on a modified electroless coating method that offers advantages such as:

- High processing efficiency
- Good processing consistency
- Low processing cost
- Scalability for large-quantity production
- Coating of carbon (or glass) fibers having a variety of diameters (2 μm, 3 μm, and 5 μm)

Development Progress

Through the modified electroless coating method, Aegis Technology has successfully synthesized smooth, uniform and continuous Cu nano-coatings with thicknesses of around 100nm and Ag nano-coatings with thicknesses ranging from 35nm to 200nm. Property measurements of the Ag-coated carbon fibers have shown that the Ag nano-coatings can achieve good electrical conductivity as high as 39.3% average conductivity and 55.9% peak conductivity of pure Ag, which far exceeds the Army's requirement of more than 10%. The Ag-coated carbon fibers also demonstrated good flexibility - no cracks or peel-offs were observed when the coated carbon fibers were bent to a curvature radius as small as 300 μm. This indicates good robustness for subsequent processing manipulations and applications. The performance and integrity of these nano-coated fibers combined with the optimization results indicate that Aegis Technology's novel nano-coating technology is ready for implementation into future industrial applications.



(a) (b)

(c)

(a) SEM image of Ag nano-coating on 3 µm carbon fiber
(b) SEM image of Ag nano-coating thickness after peeled off
(c) Prototypes of Ag nano-coated carbon fibers