

The Application of Silver Nanoparticles for Security Printing Applications

Greg Jablonski, Mike Mastropietro, and Chris Wargo, PChem Associates, Inc; and Steve Simske, Hewlett-Packard Company (USA)

Abstract

The unique properties of metallic nanoparticles lend themselves to various options in the field of security printing. The size of the particles makes the printing of ultra-fine features as small as 5 nm possible. Of particular interest are inks formulated from metallic nanoparticles that can be processed at low temperatures, yielding conductive metallic traces (printed wires) of various sizes. The unique process advantages offered by these nanoparticle-based printing inks make it possible for these materials to be deposited at high speeds on low temperature, inexpensive substrate such as the paper or cardboard based materials that are used in the packaging of high value electronic equipment. Further, the ease of processing offered by these materials makes it possible to covertly place anti-theft devices such as an RFID antenna, within the structure of a cardboard box, making it difficult to detect and disable without destroying the box. These metallic particles may also be incorporated as part of

graphic design, or they may be incorporated as a metallic thread. The formulation of inks that can be used in print processes such as ink jet, offset lithography, and flexography will be investigated. These print processes offer a wide range of process flexibility as well as print resolution. In the area of ink jet printing, we report test prints of a variety of line widths, shapes and security features (deterrents) using thermal inkjet printing. These test prints include information-containing deterrents such as 1D and 2D bar codes, for which standardized bar code reading software and hardware is deployed. This allows assessment of the relative and absolute readability of the nanoparticle-based inks.

Author Biography

Greg Jablonski is president of PChem Associates, a company that manufactures metallic nanoparticles for printed electronics and various coating applications. He has worked in the field of printed electronics for ten years, having previously served as chief technologist at Parelec.