Pd Nanoparticles as Activator for Electroless Metal Deposition via an Improved Polyol Method

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Abstract

In the conventional polyol method, addition of extra reducing agent or reacting at high temperature is needed to accelerate the reduction rate. However, our investigation shows stable and uniform Pd nanoparticles protected by polyvinyl pyrrolidone (PVP) can be successfully synthesized in pure ethylene glycol (EG) under room temperature by adding of NaOH to speed up the reduction.

The average particle size of the so-obtained Pd nanoparticles ranges from 8.6 to 2.4 nm when the NaOH changes from 0 to 3.2 x 10^{-1} M. The particle formation was monitored by UV-Vis. The product of addition NaOH in EG was characterized by FT-IR and the compound having –CHO group was identified, which possesses reductive ability and proves that adding NaOH in EG can accelerate the reduction of Pd.

The newly developed Pd nanoparticles was tested as activator for electroless copper deposit and especially for PTH processing in the PCB industry. The Pd/PVP/EG based activator shows not only superior stability but also improved performance compared with existing commercial activators. Suitable conditioning procedures for the newly synthesized activator were also developed.