Nanostructured surfaces

Annealing influence on dispersion kinetics of palladium and platinum nanofilms deposited onto oxide materials

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Platinum and palladium coatings onto non-metals are used in modern technology for different purposes. In some cases it is advisable to manufacture of non-metallic surfaces has been metallized by these metals joints using brazing or welding. These metals are interesting because of joints manufactured with using them can be operated in an oxidizing atmosphere at high temperatures.

We have investigated the of dispersion kinetics of palladium and platinum nanofilms 100 nm thickness have been deposited onto the oxide substrate (quartz glass, leycosapphire, ZrO_2 based ceramics) and annealed in vacuum at temperatures of 1000 – 1600 °C for various exposure time at every temperature.

Based on the experimental results kinetic curves of dispersion process of these films were constructed and recommendations for the practical application of the investigated nanofilms were provided.

It is found that due to the annealing in vacuum of platinum and palladium nanofilms onto the quartz glass is rapidly dispersed into separate fragments already at 1000 °C and after 1200 °C these films were completely dispersed coating with a small area of the substrate and simultaneously the material film interaction with quartz glass was occurred.

Palladium film onto leycosapphire and zirconium dioxide ceramics also quickly fully dispersed into fragments and solid drops in the first few minutes of annealing at 1100 – 1200 °C. The platinum film onto the zirconium dioxide substrate dispersed much more slowly than ones onto quartz glass that allows you to recommend this film for dioxide zirconia ceramics metallization for subsequent brazing. Platinum nanofilm onto leycosapphire unlike palladium film dispersed more slowly and this process occurred at higher temperatures (1300 °C), which makes it possible to recommend this film for leycosapphire parts metallization for subsequent brazing at temperatures up to 1300 °C.