

EXMONAN

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Structure and properties of Ag/Ge/AlN nano-multilayer system

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One of the usual technological problems in brazing industry is the development of new industrial metallic filler materials for advanced low temperature joining applications. Product development in optical and electronic fields requires a reduction of the joining temperature and time, but also improvements in the mechanical strength of the joint. The Nano multilayer systems were selected to achieve this task [1-5]. In the present study, it was investigated the structure and thermal stability of the Ag/Ge/AlN nano-multilayer coating, obtained by magnetron sputtering under different deposition conditions. The obtained nano-multilayer coatings were annealed in Air and Ar atmosphere at 3 different temperatures: 200°, 400° and 700 °C. The structure analysis was carried out using HRSEM, XRD, and RAMAN spectroscopy.

The first changes on the surface of the nano-multilayer were observed before fast annealing at 200°C in air atmosphere. BIAS application during the deposition of coating had a very strong influence on the morphology and structure of nano-multilayers due to the supplementary energy that allows Ag atoms to find the most opportune orientation. The presence of Ge slows down the outflow of Ag to the surface, owing to the solid solution formation at high temperature and higher surface diffusion during deposition as well as possible mixing between Ag and AlN layers. The tensile stress induced by the Ge in the Ag layers was observed; unlike in the results in previous works [6-7].

References

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