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Plasma electrolytic oxidation of AA 7075 with silver sub micrometric powder: A new biocide and corrosion protective coating for aluminum alloys

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Among the different applications of aluminum alloys, a very particular one is in medical field, as they can be used in external prosthetic devices, surgical try-ins, instruments and other tools. For this kind of application it is necessary the simultaneous presence of both corrosion resistance and antibacterial activity. PEO is a relatively new treatment derived from conventional anodizing that uses more environmental friendly solutions and produces a thick, dense and hard oxide ceramic coating which improves wear and corrosion properties of lightweight metals. Furthermore, silver micrometric particles can be incorporated in the PEO coating to provide a bactericide effect. Several mechanisms of interaction between silver and bacteria have been proposed: probably the bacterial cells in contact with silver take in silver ions, which inhibit several functions in the cell and eventually cause cell death. In this work, PEO coatings were produced on AA7075 using basic solution containing silicates compounds, with different operative conditions. The particles of silver, previous synthesized from silver chloride solution using glucose syrup as reducing agent, were both added to the PEO solution and used for sealing treatment. In an optic of cycle economy, the silver chloride used derived from an acid pre-treatment of electronic scraps. The coatings obtained were characterized by SEM, EDS, XRD, potentiodynamic anodic polarization test and antimicrobial tests. The results showed that the coatings formed were homogenous with higher corrosion resistance than untreated alloy and with biocide effect.

Biography

P Cerchier has completed his Master's degree in Material Engineering from Padova University and he is now in his second year of PhD in Material Engineering at Padova University.

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