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Fabrication of high biocompatible Pt-nylon and Pt-silk composite materials by supercritical carbon dioxide-assited metallization method

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As the medical technology advances, the next-generation healthcare devices are urgently demanded. Implantable and wearable medical devices are the latest applications over the decades. Nickel, copper and aluminum are widely used in aforementioned medical devices because of the simple process and low cost, however, adverse reactions such as allergies and Alzheimer's disease might take place due to the releasing of the metal ions. A biocompatible electronic material, thus, becomes the most urgent demand. Platinum is considered to be the most promising material owing to its irreplaceable biocompatibility. Moreover, nylon and silk are the common materials used in clothes. The combinations of Pt with nylon and silk textiles are considered to be promising candidates for the medical devices. Electroless plating can put these composite materials into practice and further achieves homogeneous metallized-surface due to the low deposition rate. Typical electroless plating consists of pretreatment to clean and roughen the surface, catalyzation to embed the catalysts as a nucleation site into the substrate and the plating step for the metallization. In spite of the dominance of Pt, electroless plating of Pt remains less studied due to the difficulties in controlling the catalyzation step in the electroless plating process. An up-to-date technique of supercritical carbon dioxide (sc-CO2) assisted catalyzation is practiced in this study to overcome the instinct difficulty of Pt metallization. With the help of the sc-CO2, the Pt catalyst can be inlaid into the textile structure and uniform Pt coatings can be deposited on the textile.

Biography

Tso-Fu Mark Chang has received his BSc in Chemical Engineering from the University of Toronto (2004), MS in Chemical Engineering from National Tsing Hua University (2007) and PhD in Materials Science and Engineering from Tokyo Institute of Technology (2012). He is currently an Assistant Professor of Precision and Intelligence Laboratory at Tokyo Institute of Technology. His research interests include pressure and solvent effects on reactions in supercritical CO2 and characterization of the materials fabricated in supercritical CO2. He has published more than 50 papers in reputed journals.

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