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Fabrication of Pt metallization on silk via supercritical carbon oxide-assisted electroless plating for wearable medical devices

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As the medical technology advances, the requirements of 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 the aforementioned 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 metal ion. A biocompatible material thus becomes the most urgent demand. Platinum is considered to be the most promising material owing to its irreplaceable biocompatibility. Moreover, silk is a common material used in clothes. The combination of Pt and silk is considered to be a promising candidate for the medical devices. Electroless plating can put these composite materials into practice and further achieve 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 hardship of controlling the deposition of platinum by electroless technique via the traditional catalyzation. An up-to-date technique of supercritical carbon dioxide ($sc\text{-}CO_2$) assisted catalyzation is practiced in this study to overcome the instinct difficulty of Pt plating. With the help of the exceptional self-diffusivity, low surface tension, and affinity to non-polar materials of $sc\text{-}CO_2$, the catalyst can be inlaid to the substrate while the substrate structure remains undamaged.

Biography

Wan Ting Chiu is currently a Doctoral student majoring in Materials Science and Engineering in Tokyo Institute of Technology. She has received her MS from Chemical Engineering Department at National Tsing Hua University in 2014. She has worked as a Research Assistant in Institute of Physics, Academic Sinica. She has a strong background in phase diagram and phase equilibria. Her current research topic is metallization of flexible texture for medical wearable devices.

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