Metallization on Textile by Electroless Plating with Pd or Pt Catalyzation in Supercritical Carbon Dioxide for Sensing Wearable Devices

Introduction

Wearable devices applied in various fields:

- Applications of wearable sensors:
  - Underwear
  - Detect alcohol level
  - Sportswear
  - Track motion

Electroless plating method can be applied in metallization of the textile.

Process flow for electroless plating:

1. Conventional (CONV)
2. Sc-CO2 catalyzed (SCC)

Materials:

- Pd catalyst
- Ni-P coating
- Pd-SCC
- ELP-SCE

Electroless plating method with sc-CO2 emulsified electrolyte (ELP-SCE):

- Pd-SCC + ELP-SCE
- Pt-SCC + ELP-SCE

Results and Discussion

Surface morphology and cross-sectional of Ni-P:

- SEM
- EDS

Pd-cat+CONV: there were some pin-holes and cracks.

Pd-SCC+ELP-CONV: no pin-hole and showed Ni coating on the surface of each fiber.

However, Ni-P deposition were invisible.

Pt catalyst

SEM

EDS

Ni-P deposition might be very thin.

Surface morphology of Pt by ELP-CONV after Pt-SCC:

Optical microscope

SEM

• Pt has high biocompatibility than Ni and Pd.

• Uniform Pt coating on surface of each fiber was obtained by ELP-CONV after Pt-SCC.

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Conclusions

- Uniform Ni coating on surface of each fiber was obtained when both the Pd-SCC and ELP-SCE were applied
- Ni-P deposition on the textile by ELP-CONV after Pt-SCC.
- Pt coating on surface of each Nylon 6,6 fiber was obtained by ELP-CONV after Pt-SCC.