Corrosion of a biomedical CoCrMo alloy
Study of important parameters influencing the implantability of porosity measurements
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Introduction
For biomedical alloys, the corrosion behavior is an important issue. It is influenced by several factors, including the material itself and its environment. To characterize the behavior of the implantable body parts, the necessary immersion test can be conducted. The study shows the influence of metallographic factors on the corrosion behavior. An examination of the possibility of porosity measurements is made. This study focused on the importance of porosity area on the measurement of corrosion behavior.

Material
- CoCrMo alloy
- Samples: 
  - cast billets
  - sandblasted
  - electrolytic barrier
- Microstructure: 
  - microhardness
  - porosity: 0.1%
- Parameters: 
  - porosity: 0.1%

Methods
- Corrosion tests: 
  - potentiodynamic polarization curves
  - electrochemical impedance spectroscopy
- Measurement: 
  - current density
  - potential
  - impedance

Influence of sample surface's porosity
- Effect of porosity on corrosion behavior
- Influence of porosity on corrosion current density
- Influence of porosity on corrosion potential

Influence of light
- Effect of light on corrosion behavior
- Influence of light on corrosion current density
- Influence of light on corrosion potential

Influence of age and environment
- Effect of age on corrosion behavior
- Influence of age on corrosion current density
- Influence of age on corrosion potential

Other parameters
- Temperature: no effect on corrosion behavior
- Effects of other factors: 
  - porosity, 
  - age, 
  - environment

Conclusions
The corrosion behavior is significantly influenced by the parameters in Table 1. The potentiodynamic polarization shows the corrosion behavior at a scan rate of 0.166 V/s. The corrosion potential shows a significant increase in corrosion current density, which is considered to be a factor in the corrosion behavior. Therefore, the corrosion resistance is decreased when the immersion time increases under standardized conditions.

References