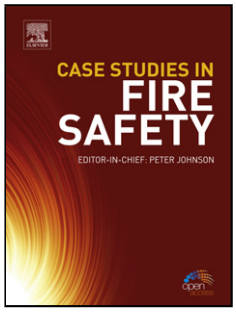

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A new approach to electropolishing of pure Ti foil in acidic solution at room temperature for the formation of ordered and long TiO_2 nanotube arrays

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Highlights

- An effective approach for the EP process of pure Ti foil at RT was developed.
- Two different temperatures were used for both sides of the Ti foil in acidic solution.
- A mirror-like surface was obtained at a backside temperature of 3°C.
- Using an optimized EP, the resulting TNT growth rate and its ordering degree improved.

Abstract

We have developed an effective approach for the EP process of Ti foil at RT in acidic solution. The idea is to use two different temperatures (3°C and RT) for both sides of foil to optimize the current density. While keeping the electrolyte at RT, the lower temperature is used for the backside cooling of foil. The Ti surface roughness decreases by approximately 91% after optimizing the EP conditions. Our results show that the growth rate of TNTs is enhanced up to 37% and a significant improvement in the arrangement is observed over a larger area, compared to unpolished foil.

Abbreviations

Electropolishing (EP), TiO_2 nanotube (TNT); roughness (R_q); room temperature (RT); viscous layer (VSL).