

## Monitoring the electrochemical behavior of a modified Ti-Ni alloy in an artificial saliva solution

### *Monitoring elektrohemijskog ponašanja modifikovane Ti-Ni legure u rastvoru veštačke pljuvačke*

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#### **Abstract**

Modern people are increasingly faced with a situation in which their body fluids, such as sweat, saliva, lymph or blood, come into temporary or long-term contact with metal objects. Contact, which occurs with dental materials, orthopedic implants, prostheses or fashion jewelry, can trigger various electrochemical processes, which can have dual consequences: it can change the structure and properties of the metals, and at the same time cause harmful reactions in the human tissue with which they come into contact. Titanium-nickel alloys (Ti-Ni) are among the most used alloys to produce both fashion accessories and various implants (dental, orthopedic). In addition to many good properties, Ti-Ni alloys have one major drawback, which is that nickel ions that are formed during the electrochemical reaction of the alloy with human electrolyte cause various allergic reactions in an increasing number of people. For the above reason, there is a great desire to find a way to prevent or minimize the release of nickel ions from the alloy. Therefore, the focus of this work was monitoring the electrochemical characteristics of the thermally modified Ti-Ni alloy. The electrochemical behavior of the thermally modified Ni-Ti alloy was monitored in an artificial saliva solution as a function of the exposure time.

**Keywords:** Ti-Ni alloy; electrochemical properties; artificial saliva

#### **Izvod**

Savremeni čovek sve se češće susreće sa situacijom da njegove telesne tečnosti, kao što su znoj, pljuvačka, limfa ili krv dolaze u privremeni ili dugotrajan kontakt sa metalnim predmetima. Navedeni kontakti koji se javljaju kod stomatoloških materijala, ortopedskih implanata, proteza ili modnog nakita, mogu pokrenuti različite elektrohemijske procese, koji imaju dvostruke posledice: mogu narušiti strukturu i svojstva samih metala, a istovremeno izazvati štetne reakcije u humanom tkivu sa kojim dolaze u kontakt. Legure titana i nikla (Ti-Ni) spadaju u najčešće primenjene legure za izradu kako modnih dodataka tako i različitih implanta (stomatoloških, ortopedskih). Pored velikog broja dobrih osobina, legure Ti-Ni imaju jedan veliki nedostatak, a to je da joni nikla nastali u toku elektrohemijske reakcije legure sa humanim elektrolitom kod sve većeg broja ljudi izazivaju različite alergijske reakcije. Iz navedenog razloga, postoji velika težnja da se nađe način da se ispuštanje jona nikla iz legure spreči ili svede na minimum. Stoga je fokus ovog rada bio monitoring elektrohemijskih karakteristika termički modifikovane Ti-Ni legure. Elektrohemijskog ponašanja termički modifikovane Ni-Ti legure je praćeno u rastvoru veštačke pljuvačke u funkciji vremena ekspozicije rastvoru humanog elektrolita.

**Ključne reči:** Ti-Ni legura; elektrohemijske osobine; veštačka pljuvačka