58. rok wydawania

11s/A/
2015

PL ISSN 0473-7733
e-ISSN 2449-9501

ochrona przed korozją

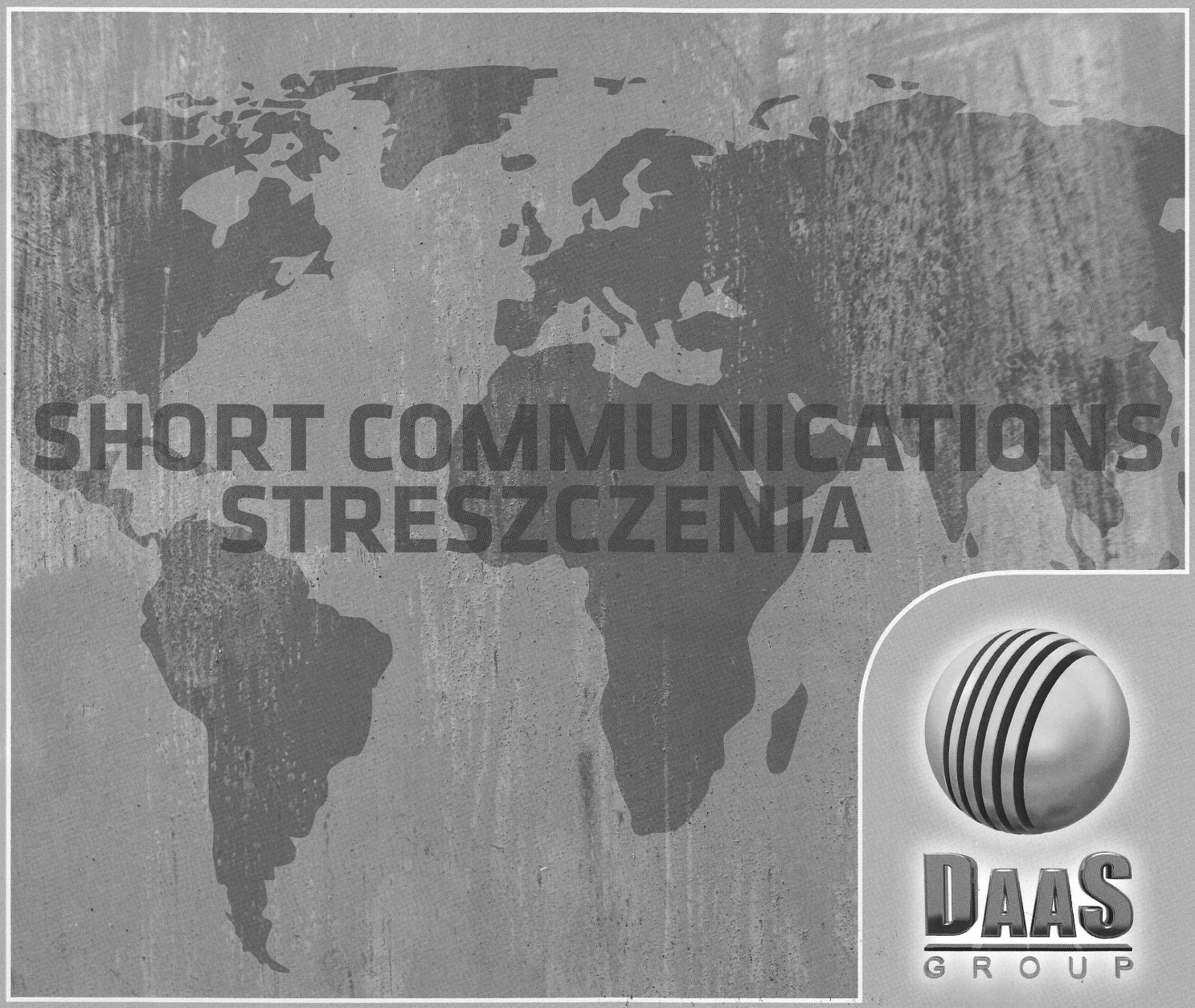
MIESIĘCZNIK

PRASA FACHOWA
SIGMA-NOT
www.sigma-not.pl

SITP Chem

NOT
Rok Jubileuszowy Zrzeszania się Polskich Inżynierów i Techników
1835-2015

Corrosion Protection



SHORT COMMUNICATIONS
STRESZCZENIA

DAAS GROUP

XVIII Ogólnopolskie Sympozjum Naukowo-Techniczne

18th All-Polish Corrosion Symposium

„Nowe Osiągnięcia w Badaniach i Inżynierii Korozyjnej"

"New Achievements in Corrosion Research and Engineering"

Jastrząb / Poraj 18–20.11.2015

400. impreza Europejskiej Federacji Korozji

400th EFC Event

tested sample was assessed.

e-mail: rabbit@ch.pw.edu.pl

NEONILA LEVINTANT-ZAYONTS
Instytut Podstawowych Problemów Techniki PAN
LECH KWIATKOWSKI
Instytut Mechaniki Precyzyjnej

ochrona przed korozją 11s/A/2015
SHORT COMMUNICATION

The effect of nitrogen ion implantation on mechanical and corrosion properties of NiTi alloy

Wpływ implantacji jonowej azotem na mechaniczne i korozyjne własności stopu NiTi

Due to superelasticity phenomena, shape memory effect and durability in many environments NiTi shape memory alloys (SMAs) are being intensively adapted for biomedical applications. However, high Ni concentration and its possible release from the surface create a problem of negative effects on biological environment. Therefore a number of surface treatments has been proposed to stabilize a surface passive layer and inhibit Ni dissolution. The main goal of the proposed article is to present results of the effect of nitrogen ion implantation on mechanical and corrosion properties of equiatomic commercial NiTi SMA. Mechanical properties (local superelasticity phenomena) of NiTi samples were determined using ultra-low load indentation system. The differential scanning calorimetry was applied to measure the change of characteristic temperatures due to ion implantation treatment. The load–penetration depth curves show that the lower of applied nitrogen doses improve mechanical properties in the near-surface layer of NiTi. Corrosion resistance of implanted samples carried out in Ringer solution was evaluated by means of electrochemical methods. The results of potentiodynamic measurements in anodic range of polarization curves for implanted samples indicated a decrease of current density in passive range in comparison with non-treated NiTi sample. Therefore an inhibition of Ni release from the alloy can be expected. The results of impedance measurements recorded at the corrosion potential show a capacitive behaviour for all samples without clear predominance of one of them. It can be explained by the fact that this result concerns the case of general corrosion in the beginning of exposition. Prolonged exposition gives rise to the occurrence of local corrosion. It is shown in this work that nitrogen ion implantation (fluences 10^{17}- 10^{18} ion/cm^2, energy 50 keV) leads to a creation of modified surface of improved physicochemical properties with unchanged shape memory effect.

Keywords: shape memory alloy (SMA), nitinol, ion implantation, superelasticity, corrosion resistance

Corresponding author: **Neonila Levintant-Zayonts**
e-mail: neonila@ippt.pan.pl