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Effect of Annealing on Surface Morphology of Porous NiTi Shape Memory Alloy

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Source METAL SCIENCE AND HEAT TREATMENT

View Journal Impact

DOI: 10.1007/s11041-026-01243-9

Early Access OCT 2026

Indexed 2026-10-23

Document Type Article; Early Access

Abstract The effect thermal annealing on the surface morphology of porous NiTi shape memory alloy by forming the in-situ oxide

layer was studied. The porous samples fabricated via powder metallurgy was thermal annealed at various temperatures ranging from 300 to 700 degrees C. A scanning electron microscope equipped with an energy dispersive spectrometer and an x-ray diffractometer were used to analyze the surface morphology and identify the phases, respectively. After annealing, the samples were tested for biocompatibility to evaluate the Ni ion leaching using an inductive pair plasma mass spectrometer. It was found that a stable TiO2 layer is formed on the surface of the porous NiTi alloy during annealing. However, at higher annealing temperatures, a thicker unstable and brittle TiO2 oxide layer is formed, resulting in an increased release of Ni ions. Overall, the development of a porous NiTi alloy with a passivated surface through thermal annealing has shown promising outcomes for potential applications in the biomedical field.

Keywords

Author Keywords: shape memory alloy; NiTi alloy; thermal annealing; surface morphology; porous; biocompatibility

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Categories/ Classification

Research Areas: Metallurgy & Metallurgical Engineering

Web of Science Categories

Metallurgy & Metallurgical Engineering

Funding

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Funding agency	Grant number
FRGS-RACER of the Ministry of Higher Education	RACER/1/2019/TK05/UIAM//1

+ See more data fields

Journal information

METAL SCIENCE AND HEAT TREATMENT

← View Journal Impact

0.12
Journal Citation Indicator ™ (2025)

ISSN	0026-0673
eISSN	1573-8973
Current Publisher	SPRINGER, ONE NEW YORK PLAZA, SUITE 4600 , NEW YORK, NY 10004, UNITED STATES
Research Areas	Metallurgy & Metallurgical Engineering
Web of Science Categories	Metallurgy & Metallurgical Engineering

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