

Posudek práce

**předložené na Matematicko-fyzikální fakultě  
Univerzity Karlovy**

√ posudek vedoucího  
√ bakalářské práce

Autor/ka: Jakub Zeman

Název práce: **Inducing Two-way Shape Memory Effect in NiTi-polymer Composite**

Studijní program a obor: Bachelor Thesis

Rok odevzdání: 2024

Jméno a tituly vedoucího: **Dr Sneha Manjaree Samal**

Pracoviště: Fyzikální ústav AV ČR, v. v. i.

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**Odborná úroveň práce:**

velmi dobrá

**Věcné chyby:**

vzhledem k rozsahu přiměřený počet

**Výsledky:**

originální

**Rozsah práce:**

standardní

**Grafická, jazyková a formální úroveň:**

velmi dobrá

**Tiskové chyby:**

vzhledem k rozsahu a tématu přiměřený počet

**Celková úroveň práce:**

velmi dobrá

## **Slovní vyjádření, komentáře a připomínky vedoucího:**

The bachelor thesis of Jakub Zeman has focused on “Induce two-way shape memory behaviour in NiTi-polymer composite”. The content of the thesis has sufficiently fulfilled for the accomplished of bachelor’s degree. The aim of the thesis is to induce two-way shape memory behaviour in composite, however its extent to the field of bistable two-way shape memory behaviour. As a result, the aims are slightly confusing. The literature review has performed briefly with fundamental understanding about the concept and approach. Based on the state of the art of the thesis, bibliography content is less. The characterization of NiTi plate for SE and SMA has been studied well however in case of polymer 3D printing includes various anisotropic factors to the study. My impression is that the complexity of the selection of polymers for the compatibility with NiTi alloy is little bit too much for the bachelor student; however, the author fights quite well with obstacles. Laser lines pattern was imprinted on the surface of the NiTi was well elaborated, more details of the laser power is missing. Rather presenting power in percentage, it could be presented in Watt. The hysteresis effect of the laser pattern and annealed NiTi plates were analyzed, however the plates were used in the study was annealed with laser line. This is a gap in analyzing the sample. The composites were fabricated by hot press shows some porosity in TPU/PCL bended polymer. This could be tailored for the better quality of the composite. Then finally composites were characterized using TMA and DMA techniques, the procedure was well elaborated. On the results two-way shape memory is achieved in NiTi-blended TPU/PCL composite, however the bistable TWSME is not very significant. The fixity and recovery percentage are not very clear in the study. How author calculate the percentage of deformation and recovery? Although two equations are mentioned, however it’s not clear of using this equation in achieving these results in recovery and fixity ratio in %. However, as a bachelor thesis it fulfils the requirement. In my view, the thesis fulfils the requirements for a bachelor thesis at Mathematics and Physics Faculty, Charles University, I recommend it for the defense and suggest a grade B.

**CONTRIBUTION:** The author presents original ideas on the topic demonstrating critical thinking and ability to draw conclusions based on the knowledge of relevant fundamental background and experimental results. There is a distinct value added of the thesis.

**METHODS:** The equipments used are relevant to the research aim being investigated, and adequate to the author’s level of studies. The thesis topic is comprehensively analyzed.

**LITERATURE REVIEW:** The thesis demonstrates author’s full understanding and command of recent literature. The author quotes relevant literature in a proper way.

**MANUSCRIPT FORM:** The thesis is well structured. The student uses appropriate language and style, including academic format for graphs and tables. The text effectively refers to graphs and tables and disposes with a complete bibliography.

## **Případné otázky při obhajobě a náměty do diskuze:**

What is the author understanding about composite bending and deformation ?

How the radius of curvature defines the bending stiffness in the sample?

The schematic diagram should explain theoretical fundamental background prior to experimental approach.

The fixity and recovery percentage are not very clear in the study.

How author calculate the percentage of deformation and recovery?

Although two equations are mentioned, however it’s not clear of using this equation in achieving these results in recovery and fixity ratio in %.

**Práci**

doporučuji  
uznat jako bakalářskou.

**Navrhuji hodnocení stupněm:**

velmi dobře

Praha, *Štáhl*  
18.6.2024

Místo, datum a podpis vedoucího/oponenta: