



Antwerp, 30 September, 2021

Dear Mrs Zabranska,

Please find herewith my written recommendation on the thesis entitled “*Effect of Microstructure on Fatigue of Superelastic NiTi Wires*” by Ing. Ondrej Tyc. The thesis comes along with 10 A1 journal publications of which 3 with the candidate as first author, the latter published in recent years (2020, 2021). The work is a continuation of earlier investigations from the same group and focusses on the problem of fatigue in NiTi wires subjected to pulse annealings and as a result of accumulated unrecovered strains and microstructures evolving upon cycling. The work is certainly up to date and brings new insight into the connection between treatment, behaviour and microstructure. The candidate has used various thermomechanical techniques to treat and investigate the characteristics, including DSC, dilatometry, SEM, TEM and SANS. The aim of the work was to find a suitable strategy for improving the fatigue performance of superelastic NiTi and although perfect conditions are not obtained, essentially since most factors (e.g., pulse time and following grain size) work in opposite directions on different parameters such as stress-strain response and fatigue life, a scheme allowing for estimating the behaviour of various NiTi wires in a wide range of thermomechanical loading tests is introduced. The candidate gives an extensive introduction on the state of the art of the various aspects of the interaction between microstructure, superelasticity, failure and fracture in NiTi. He then continues with describing his experimental approach and his results, which he finally combines in a discussion chapter. The approach and selection of experiments is well-defined and properly aimed for the question at hand and the candidate gives a very solid description and interpretation of the observations. Although one can think of more and/or other matters to investigate in this respect, I am confident about the quality of the work and can recommend the thesis for presentation and defense.

Sincerely,

Prof. Dr. D. Schryvers  
Electron Microscopy for Materials Science (EMAT)  
University of Antwerp, Belgium  
[nick.schryvers@uantwerpen.be](mailto:nick.schryvers@uantwerpen.be)  
tel.: +3232653247

