

## OPONENTNÍ POSUDEK

dizertační práce Thomase Haenela

„Curing of Visible Light Curing Resin Based Dental Composites“

Vypracoval: **Ing. Vladimír Pelíšek, Ph.D., R&D Manager Europe & South Africa**

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In a well-understandable manner, the thesis submitted deals with a topic that has been growing in importance within a few decades. The topic of the thesis has essential impacts to many aspects of everyday life, representing an area of plastics-based composites into dental medicine.

The thesis is segmented into six well understandable papers with a detailed information contained. Reaction kinetics as related to mechanical and viscoelastic parameters of VLC RBC composites are studied. A new degree of conversion function is stipulated which provides an improved representation of DC-data. As obvious, the kinetics is mainly determined by the reaction time constant depending on the irradiance of the light curing units examined. LCU irradiation distribution is reflected in the distribution of mechanical parameters. Specifically, longer exposure times increase the hardness level but do not level out the imprinted patterns. Irradiated samples generated hardness curves possible to be shifted to a master curve enabling long term prediction of the hardness as well as DC, though not directly. Also, there was presented a new method of depth of cure determination that can be applied also in other light curing composite depth-dependent parameter.

The thesis quality is very good, and the results are presented in a convincing manner. Let me just have four questions I would like the author to deal with during / after his presentation:

- It is nicely shown that curing lights may differ significantly with respect to light intensity distribution. But how does this effect the composite especially in the case where a composite contains only one initiator system and is irradiated with a poly-wave curing light?
- The post-curing investigations lead to the conclusion that the hardness increase is an ongoing and down slowing process. Do you think that hardness increase comes to zero?
- Another interesting finding of post-curing investigations is that the increase of surface hardness is higher than increase of bottom hardness. What does this mean from a materials scientific point of view? How does this fit to your measurements of hardness distribution? And are there any practical implications for the dentist?
- In the DC paper you say in a convincing manner that exposure reciprocity does not hold? Can you explain what exposure reciprocity means and where it basically comes from? Why was it “verified” by some researcher in the field of dentistry although the formulas of reaction kinetics immediately show that it should not be true?

The quality of thesis is very good so let me recommend the committee members the “**passed**” statement.

With best regards  
Vladimír Pelíšek

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