

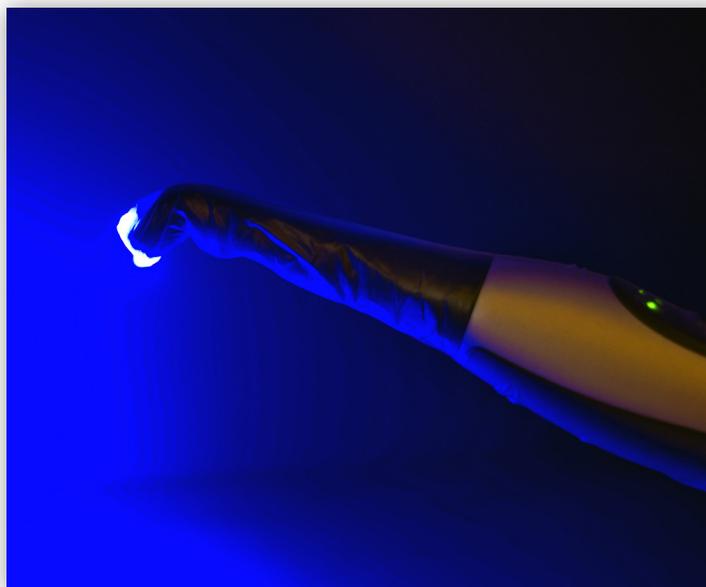
## Safe and sufficient light curing of dental materials



Proper light curing is mandatory for restoration success, a recent article from NIOM scientists in *Aktuel Nordisk Odontologi* ascertained. Light curing can be a process that does not receive the attention it requires, but there are simple ways to optimise the light curing procedure.

### Advice for safe and effective curing:

- Know your curing lamp! Check out the irradiance of the curing light at the time of purchase and monitor the irradiance over time using a radiometer or by other means described in the publication.
- Adjust the curing time depending on the clinical conditions. For instance, increasing the distance or angle between the curing light tip and restoration surfaces will decrease the irradiance to the restoration, and may eventually reduce the curing depth. In this case, you will have to increase the curing time.
- We recommend using a transparent sleeve to cover the light tip to avoid contamination of biological or material samples and to avoid scratches.
- Protect yourself from the emitted light of the curing lamp.



Applying too short light curing time or too low light output (irradiance) may lead to inadequate curing. Use at least the recommendation from the manufacturer of the material and never less than 10 seconds. On the other hand, too long curing time, especially in combination with too high irradiance, may increase the risk of heat dissipation and hazard to oral tissue and pulp. Irradiance above 2000 mW/cm<sup>2</sup> is not required to obtain sufficient curing.

### Read more:

Bruzell E, Kopperud HM, Rukke HV. Lyshering – så enkelt og så vanskelig. *Aktuel Nordisk Odontologi*. Universitetsforlaget, Oslo. 2018; 43: 68-77. ISSN Print: 1902-3545; ISSN Online: 2058-7538; DOI: 10.18261/issn.2058-7538

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## TMA offers valuable insight of materials properties

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**In terms of dental materials, thermal properties are of high importance, especially if different materials are to be joined together. Dental crowns or bridges consist of metal alloy or ceramic cores covered with veneering ceramics. These materials undergo changes during heating and cooling.**

Thermomechanical analysis, TMA, can provide valuable information on materials which influence on production conditions for dental restorations that is difficult to obtain by other analytical techniques. NIOM offers accredited testing of coefficients of linear thermal expansion for dental metals, alloys and crystalline ceramics, and also glass transition temperature for glass-containing ceramics with a Perkin Elmer TMA 4000. Glass transition is typical for amorphous materials, like glass and polymer materials. Therefore this instrument is also suitable for determining the same parameters for polymer materials.

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Thermomechanical analysis provides valuable insight into structural changes or phase transformations. Coefficients of thermal expansion for the core material and the veneering material will always be different and stresses will be built up between the two materials by repeated heating and cooling during veneering.

Metal alloys and crystalline ceramics have almost a linear thermal expansion from low temperatures up to a possible phase transformation or melting point while veneering ceramics consisting of a glass matrix filled with different crystals have a change at a temperature called glass transition temperature ( $T_g$ ).

Another dental situation where materials are combined and significant stresses may occur is removable prosthesis due to consumption of coffee and ice cream despite the limited temperature variations. Stress developments due to thermal treatments of material combinations have been analysed with TMA by researchers at NIOM and the study has been published (ref).

The technique provides valuable information on materials that is difficult to obtain by other analytical techniques.

If you have questions regarding TMA or other methods for material testing, please visit [niom.no/materials-testing](http://niom.no/materials-testing) or contact niom at [niom@niom.no](mailto:niom@niom.no)

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### Reference:

Ketil Kvam and Håkon Herø, Stress relaxation in titanium-ceramic beams during veneering, *Biomaterials* vol 22, Issue 11, 2001:

<https://www.sciencedirect.com/science/article/pii/S0142961200002933>