3M Science. Applied to Life.™

3M℠ Health Care Academy

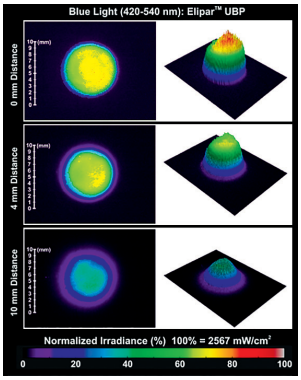
Light polymerisation is decisive!

In light polymerisation, not only device-related aspects such as performance, emitted wavelength range and the homogenic irradiance per surface area should be taken into account, but also a wide range of application criteria [1]. If years ago light polymerisation was regarded as a necessary evil, in the meantime we recognise that, apart from the correct adhesive technology, sufficient light polymerisation appears to be the actual key to success in direct adhesive restoration.

Prof. Dr. Claus-Peter Ernst

There is an internationally recognised consensus report [2, 3] on the topic of light polymerisation that summarises all the relevant aspects of the process:

1. Selection of a light curing device: not all light curing devices are identical. Use only those devices from manufacturers who provide sufficient information and service on the unit, and whose performance capability has been confirmed by an independent agency.
2. Every user should know the key characteristics of his light curing device, such as the spectral distribution of light and its uniform radiation over the surface and its diameter as well as the energy density in mW/cm^2.
3. For short exposure times (e. g. 1 – 5 sec), it is extremely important to locate the light emission window continuously over the composite increment to be polymerised. Not all composites on the market can be sufficiently cured with such shortened polymerisation times. It is therefore advised to check the relevant scientific literature for confirmation that such an application provides safe results using a respective composite.
4. Before a light polymerisation process, the light curing device should be regularly examined and repaired or replaced if not compliant with the manufacturers specifications.
5. The light curing unit and the light tip should be clean, intact, and free of contamination.
6. Take into account that every composite material requires a certain minimum of light energy in a certain wavelength range in order to sufficiently polymerise. The energy dose (J/cm^2) administered in such a way results from the product of the light emission performance (mW/cm^2) and the exposure time in seconds. Be aware of the recommendations of the composite's manufacturer with regard to maximum thickness of the layer to be polymerised and the corresponding exposure time. The exposure time should be lengthened accordingly for the application of darker or opaque composites or while enlarging the distance between the light guide tip and the composite.
7. It is best to use a light tip that guarantees a uniform radiant emittance and covers as much of the composite surface to be polymerised as possible. Every surface should be polymerised separately; perform an overlapping polymerisation if the diameter of the light guide tip is smaller than the restoration diameter.
8. During the polymerisation process, the light guide tip must be positioned and stabilised as close as possible to the composite increment to be polymerised but without making any contact.
9. Since the correct positioning during the complete polymerisation cycle must be retained, it is essential to continuously observe the position of the light guide tip. We urgently recommend wearing blue-blocker safety glasses to prevent irreparable damage of the eyes. For certain, light emission must not be directed into the eyes of anybody.
10. Avoid moving the light guide tip several millimetres away from the tooth or to angle it out of the ideal 90° angle-position. Likewise avoid any contamination or damage to the light guide tip or the optical system. Additional polymerisation intervals should be scheduled for overcoming a blending effect of a metal matrix or the presence of interfering overhangs of tooth or restorative material.
11. Especially when using high-energy light curing devices or above-average long polymerisation intervals, always think about potential thermal damage to the pulp or soft tissue surrounding the tooth. In such cases, be sure to cool sufficiently with air (or a large suction unit positioned opposite).
12. With respect to performing quality control of the attained polymerisation, every therapist must be aware that a hardness test of the polymerised surface with a probe provides **no** relevant information about the actual degree of polymerisation.



Due to the optimised optics, the 3M Elipar™ DeepCure-S LED Curing Light delivers a more homogenous energy distribution throughout the restoration. This can give you confidence that your restorations will have a deep, uniform cure – from center to rim, from surface to cavity bottom and at clinically relevant distances.

Literature:

1. Ferracane J, Watts DC, Barghi N, Ernst CP, Rueggeberg FA, Shortall A, Price R,wStrassler H. Der effiziente Einsatz von Lichtpolymerisations-geräten – ein Leitfaden für Zahnärzte [The efficient use of light polymerisation devices – a guideline for dentists.] ZMK 2014; 30: 166-180.
2. Hickel R, Pfefferkorn F. Lichthärtung – ein Leitfaden für Praktiker [Light curing – a guideline for practitioners.] zm 2015; 105 (5): 52-53.
3. Roulet JF, Price R. Light curing - guidelines for practitioners – a consensus statement from the 2014 symposium on light curing in dentistry held at Dalhousie University, Halifax, Canada. J Adhes Dent 2014; 16: 303-304.

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