WHAT YOU NEED TO KNOW ABOUT LIGHT CURING UNITS

Ass.Prof.Samer Aun Thyab

Successful CURING

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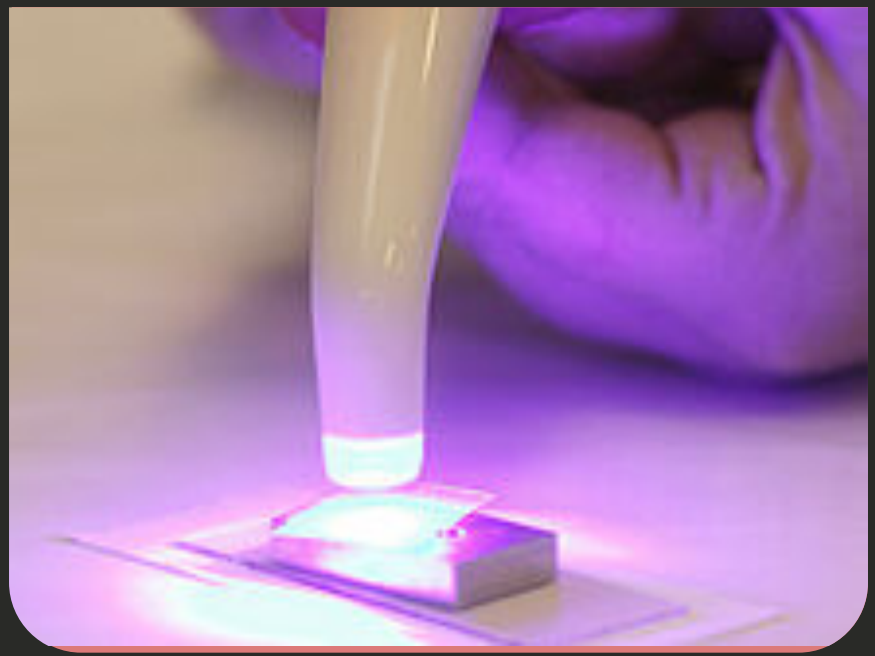

The dental light-curing unit (LCU) is an essential part of the process of photocuring a resin, yet the relevance of the LCU and how it is used to achieve the successful outcome of a resin- based composite (RBC) restoration is often downplayed.

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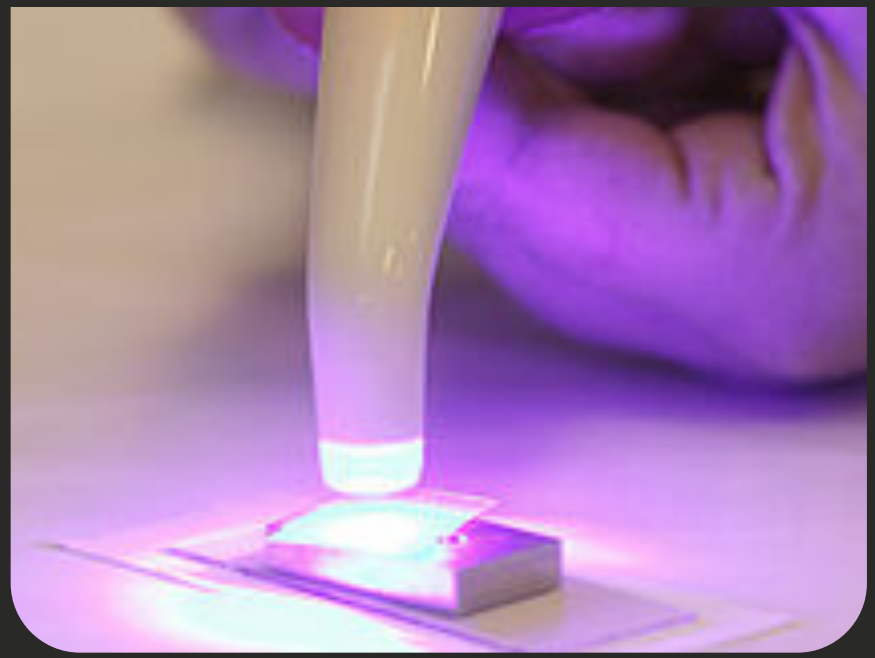


Successful CURING

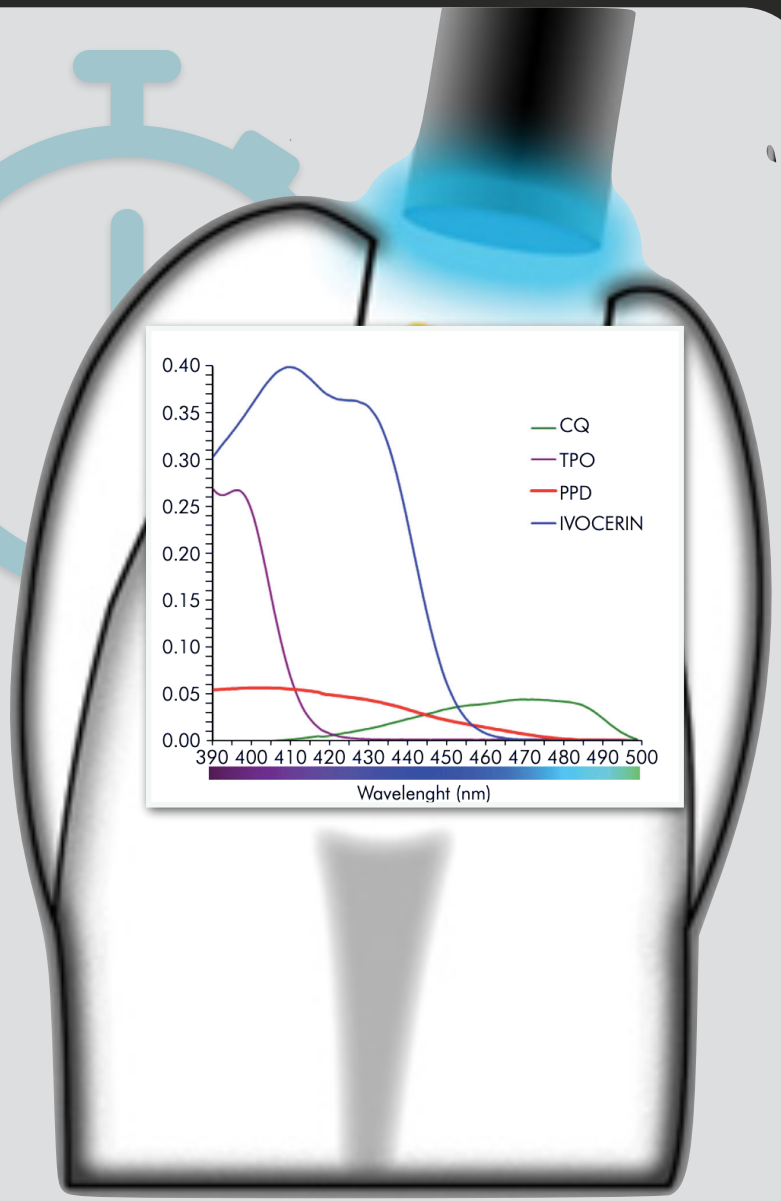
- Much of dentistry today depends on adequate resin photopolymerization (Price RB, Ferracane JL, Shortall AC.2015)
- it appears that many dentists take light curing for granted (Strassler HE, Price RB. 2014)

Terminology

- RADIANT POWER (Radiant energy per unit of time)
- POWER OF EXISTENCE (Radiant power emitted from a surface of a curing light. Its the same as irradiance at zero distance such as would occur when having the light tip or exit window in direct contact with the sample surface.
- SPECTRAL RADIANT POWER (Radiant power per wavelength)

Terminology

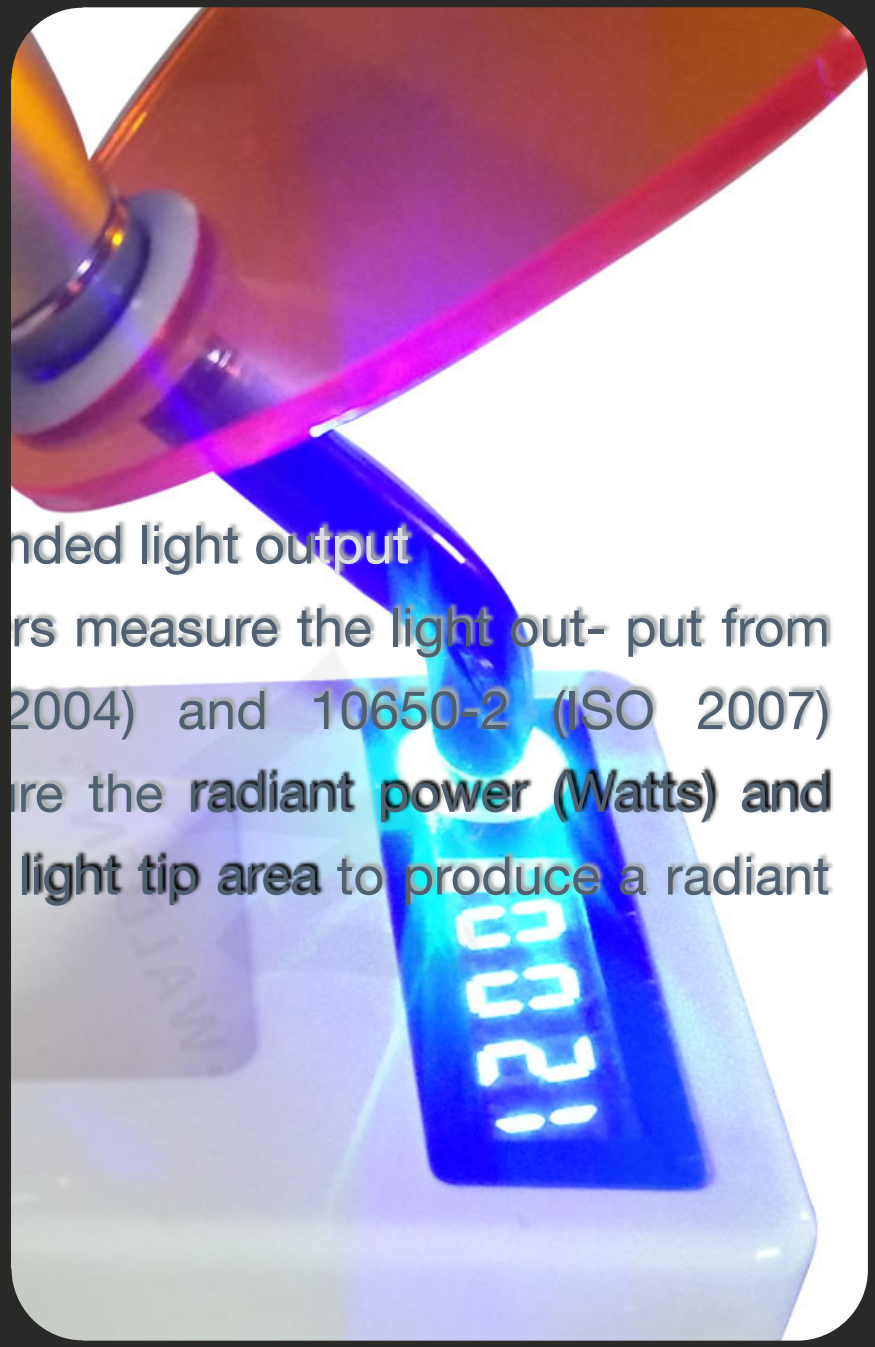
- RADIANT POWER (w/sec)
- POWER OF EXISTENCE (W/cm²)
- SPECTRAL RADIANT POWER (W/nm)



Measuring Light Cure Output

many unites do not deliver their int nded light output

Some researchers and manufactu rs measure the light out- put from LCUs using the 10650-1 (ISO 2004) and 10650-2 (ISO 2007) standards. These standards mea re the **radiant power (Watts) and then divide this power value by th light tip area** to produce a radiant exitance value (W/cm2)



Measuring Light Cure Output

LIMITATIONS

- The light emitted ≠ light received
- Active light beam area
- The inhomogeneity in the light output from the LCU
- Delay in responce
- Initial spike in LCU output

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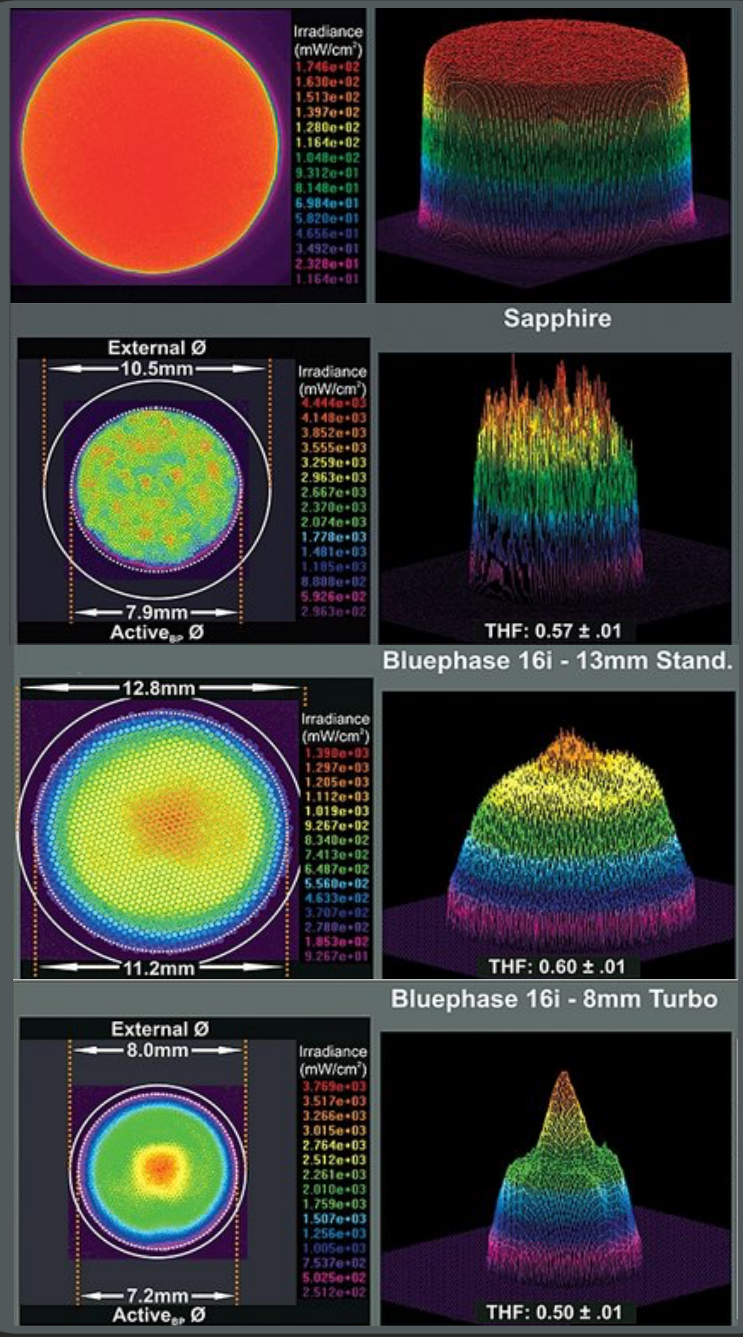
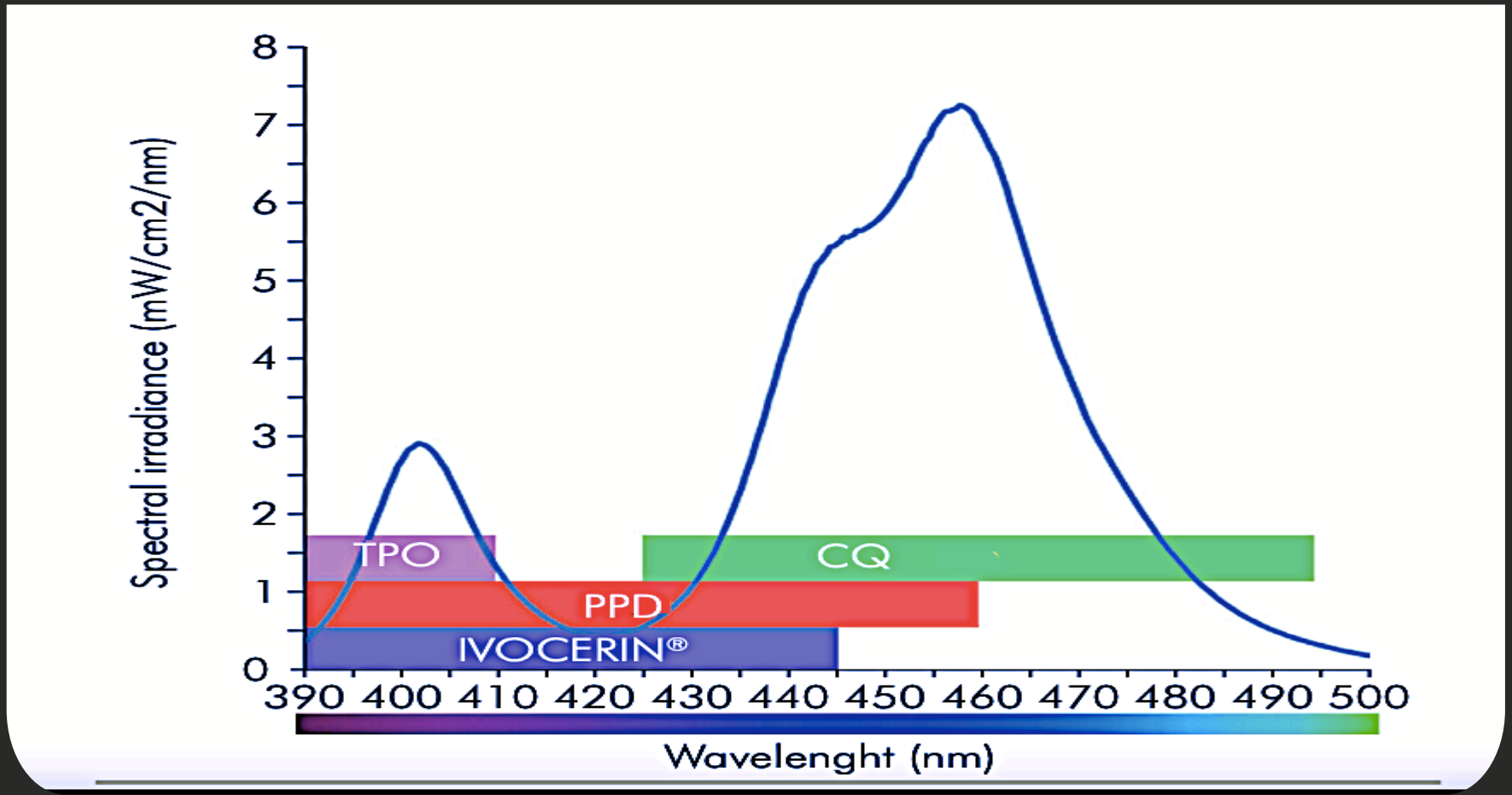
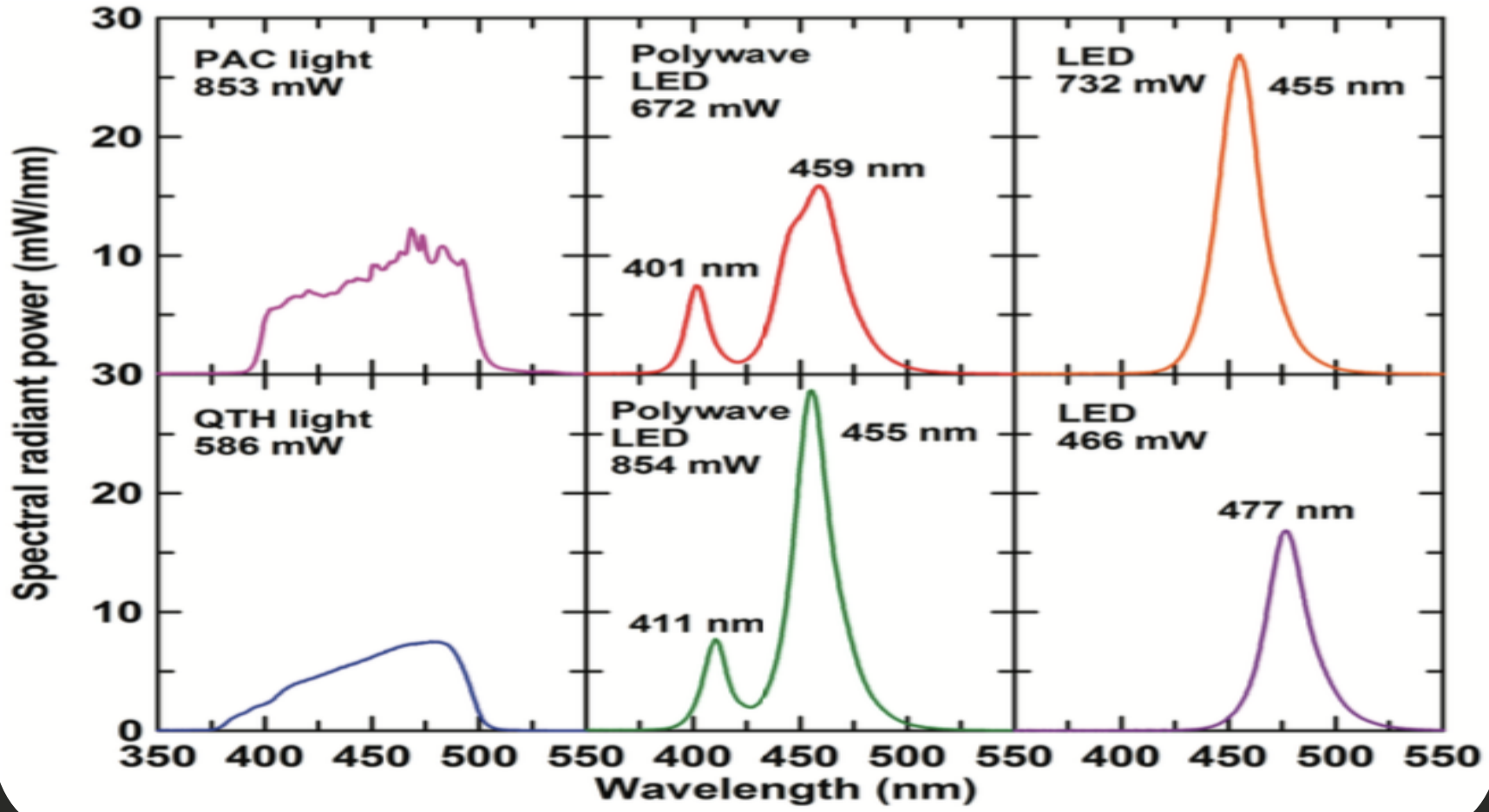


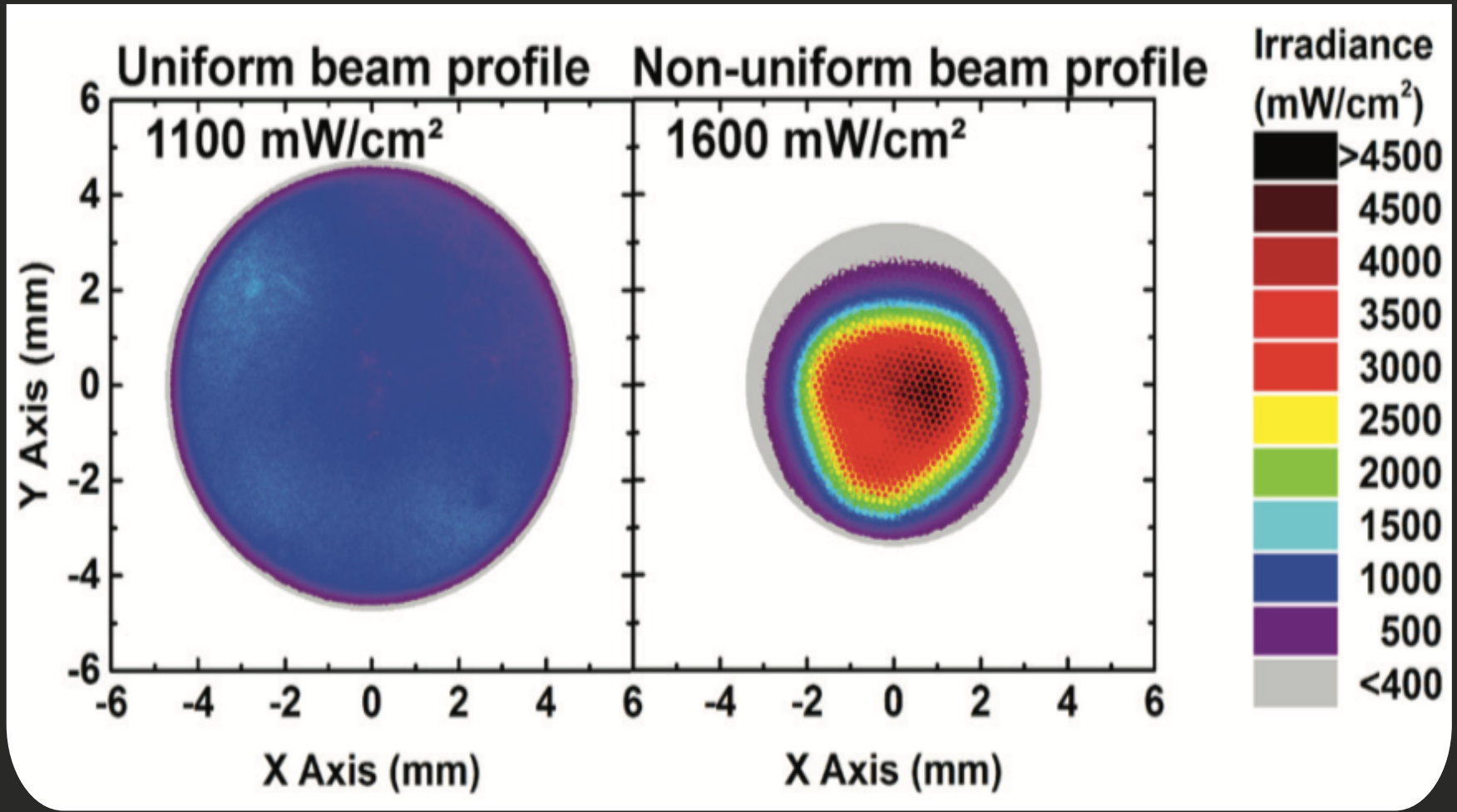
Spectral Emission- Spectral Radiant Power

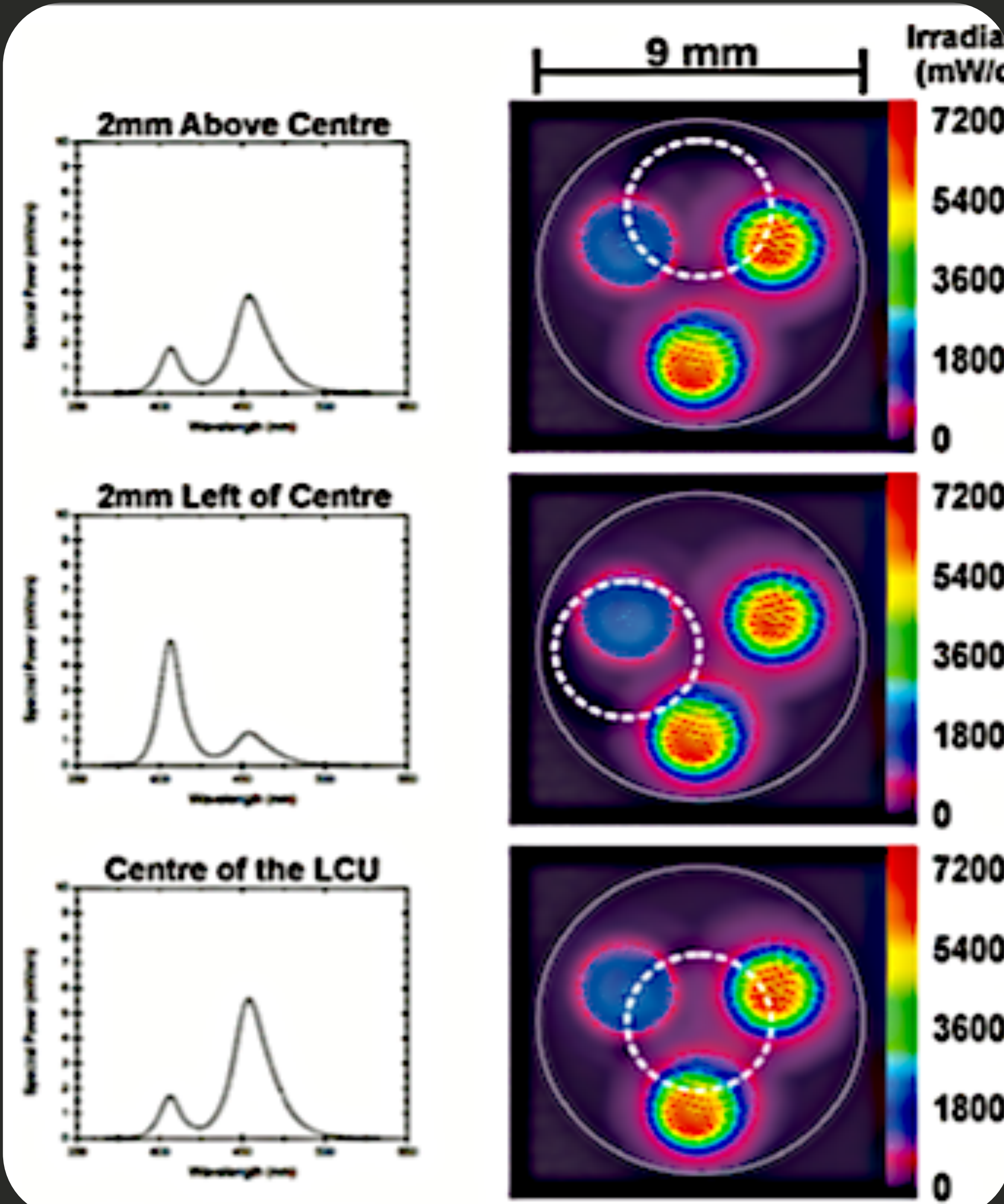


Spectral Emission- Spectral Radiant Power



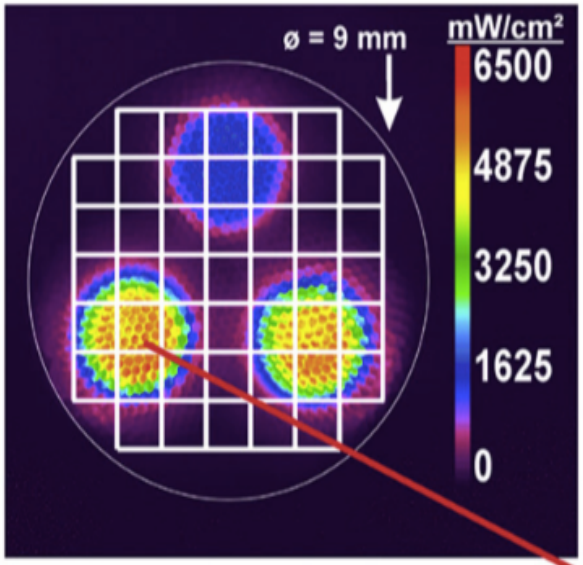
Beam Profile from the LCU





MONOWAVE VS POLYWAVES

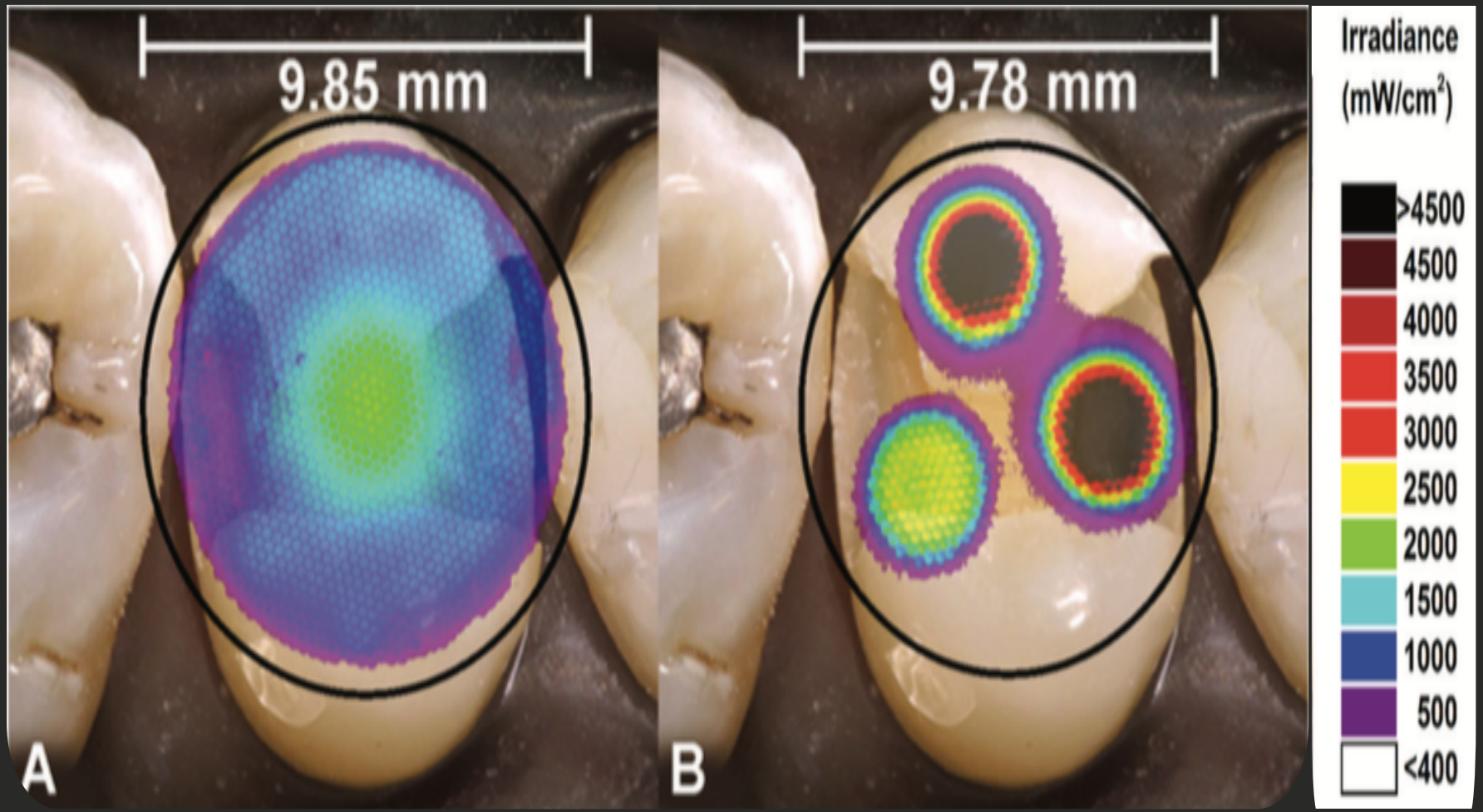
Mean Irradiance (mW/cm²)



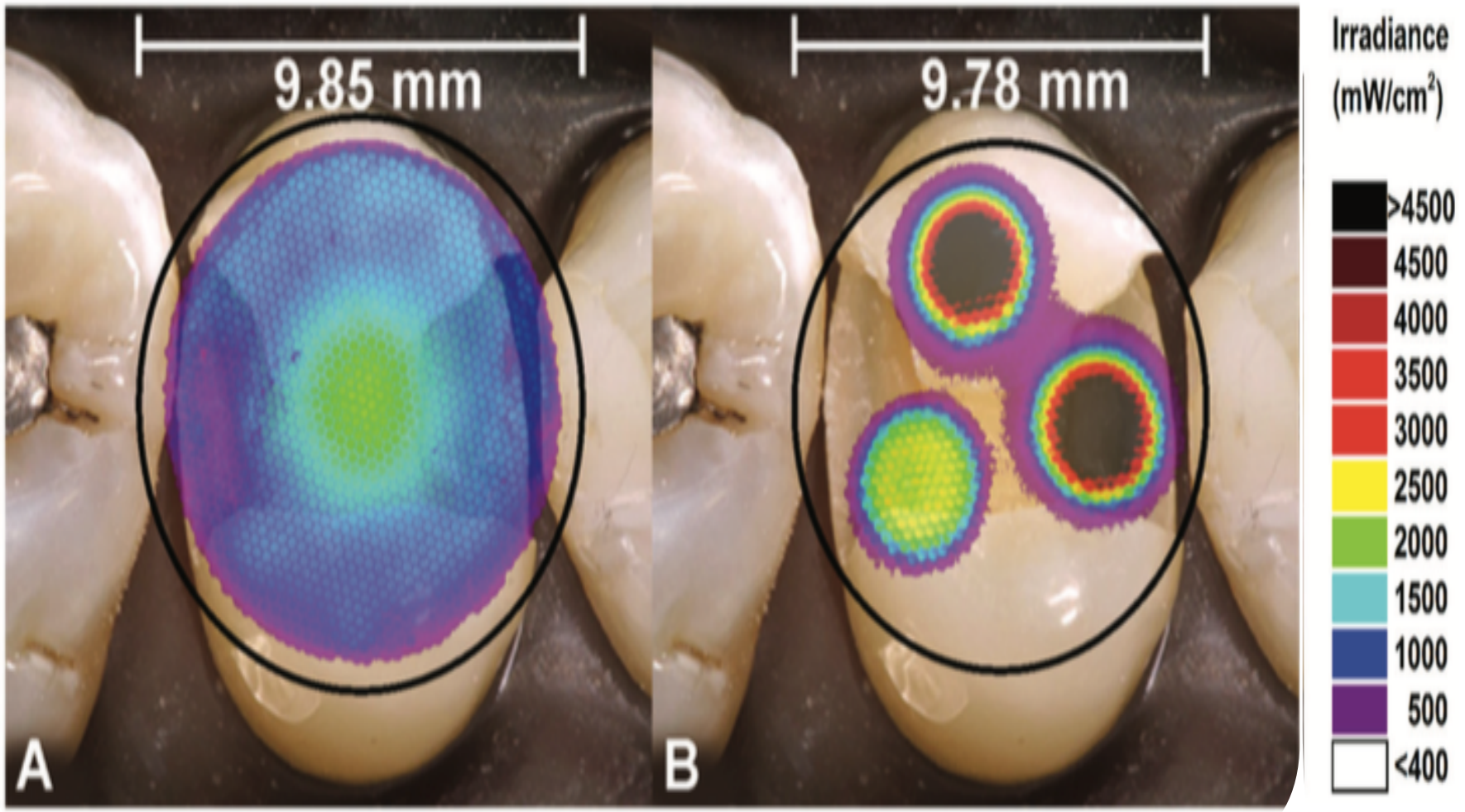
Each Square Shows Mean Irradiance From 3200 Pixels

(mm)	1	2	3	4	5	6	7
1		195	1011	1671	1035	192	
2	105	205	1261	1743	1257	216	95
3	200	296	505	890	507	270	173
4	1290	2673	1046	363	1086	2005	1009
5	3632	5278	3194	589	3356	5046	3236
6	2214	4268	1742	398	2273	4393	2303
7		426	226	132	289	488	

spatial and spectral irradiance uniformity from the LCU.

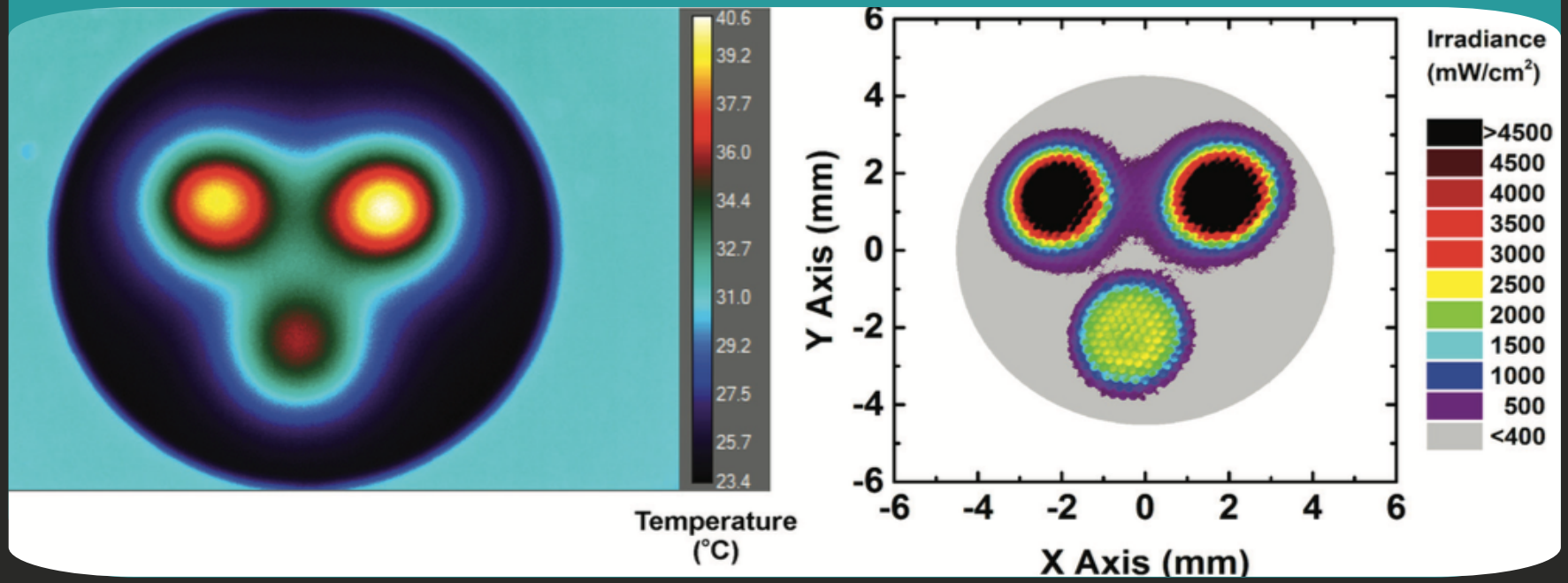


spatial and spectral irradiance uniformity from the LCU.



Temperature Changes and the LCU

- Conversion reaction can increase by 1.90% for each 1 °C rise in temperature
- RBCs polymerized at an elevated temperature (37 °C) build up stress more rapidly than specimens at 23 °C



Solution

Researcher

If you were a

Clinician

If you were a

CLINICIAN

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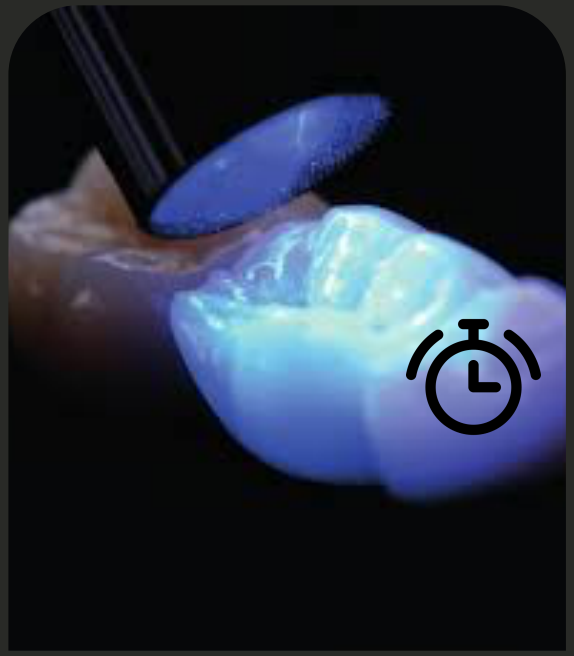
If you were a

Non Fiber optic

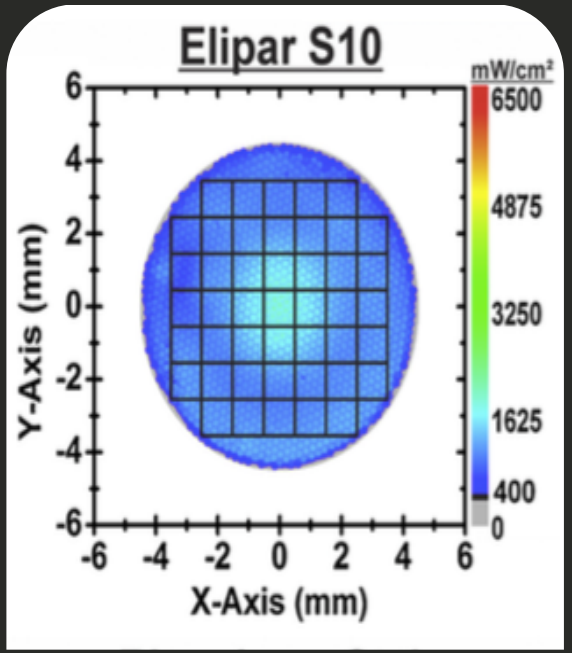


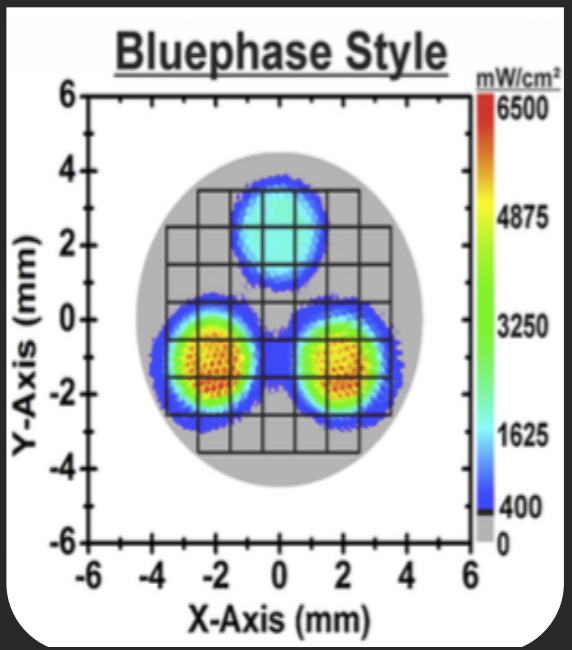
Curing time

SINGLE WAVE VS MULTI WAVE

CLINICIAN

If you were a





USING LCU OF THE SAME MANUFACTURERS

CLINICIAN

If you were a

If you were a RESEARCHER

The manufacturer's instructions for use are often based on a "best-case" scenario using a specified new LCU, a known material thickness, and under ideal laboratory conditions where the LCU is stabilized directly over the RBC

1. Radiant power output throughout the exposure cycle and the spectral radiant power as a function of wavelength
2. Analysis of the light beam profile and spectral emission across the light beam
3. Measurement and reporting of the light the RBC specimen received as well as the output measured at the light tip


thank you