Universidade de São Paulo
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Laboratory of Optical Radiometry and Dosimetry of the University of São Paulo – Ribeirão Preto Campus

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Thematic Network for Ultraviolet Measurement – UVNet

The laboratory of optical dosimetry is located at the Physics Department of one of the campi of the University of São Paulo, in the northeast of the state of Sao Paulo, in the city of Ribeirão Preto (-21.167177,-47.848099).

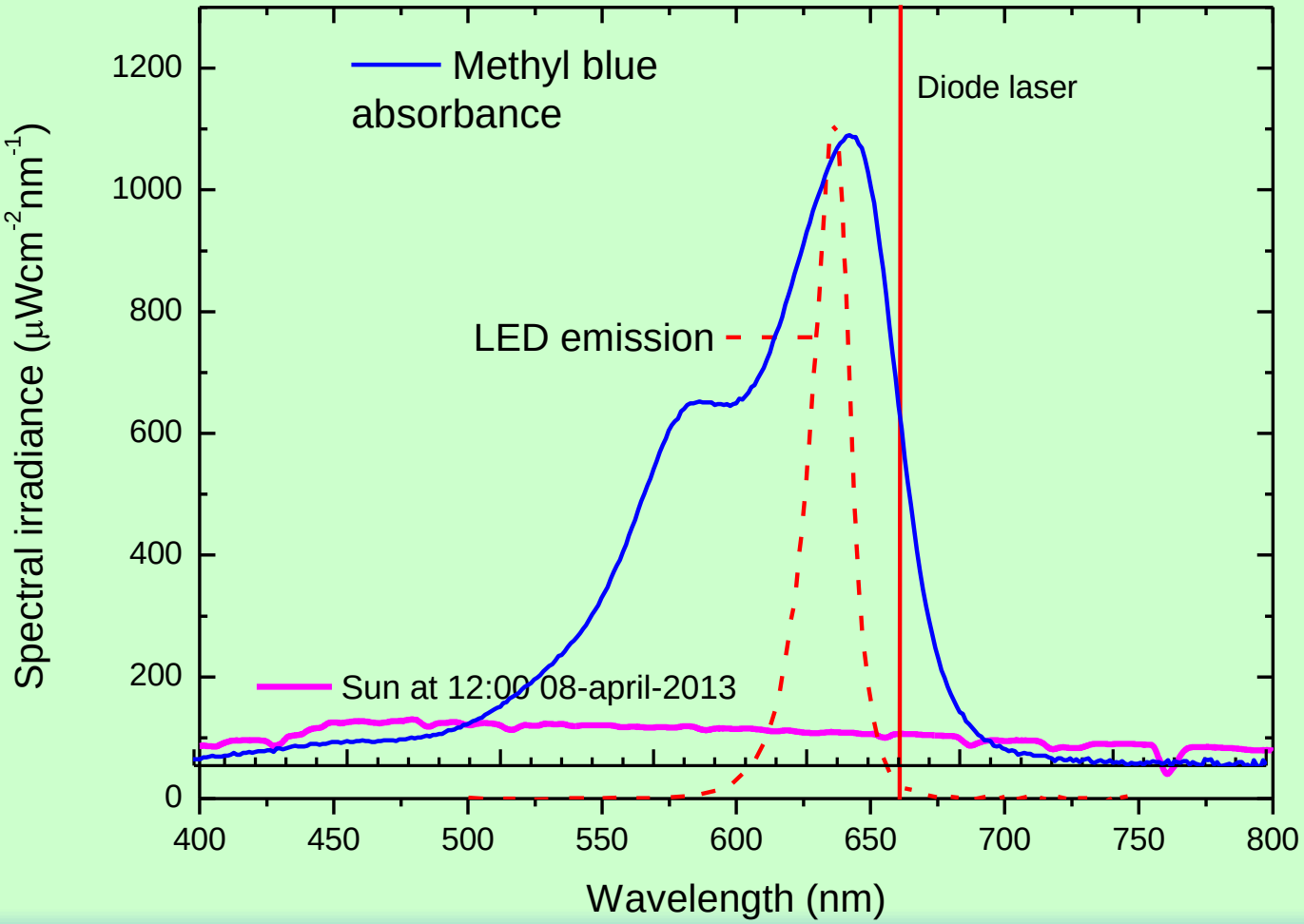
The research activities conducted in this campus focus mainly on the medical, dentistry, and pharmaceutical areas; this same campus is located in an important area for agriculture including sugarcane and orange production.

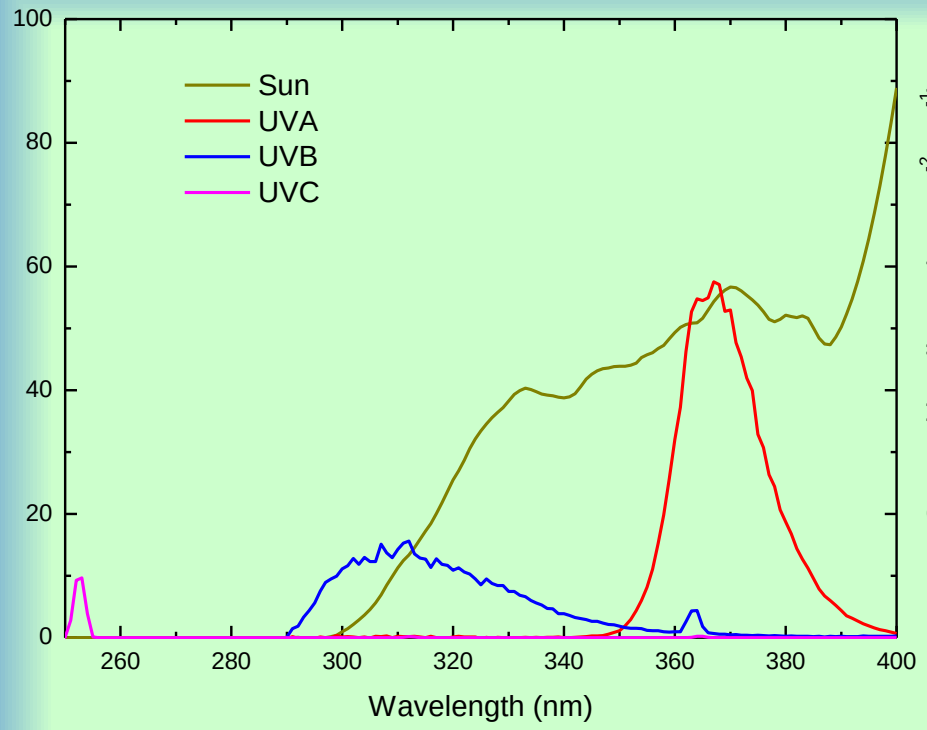
The goal of the laboratory is to expand the activities related to UV spectroradiometry, including daily acquisition of solar emission, to provide the community with the spectral irradiance, total integrated irradiance, and effective irradiance.

These parameters would be useful for the skin cancer epidemiology and dermatology research community; they could also help monitoring how UV light impacts biodiversity and can employed to promote increased productivity in agriculture and better plant pathogenic control.

Spectral irradiance (Sun, LEDs, laser)

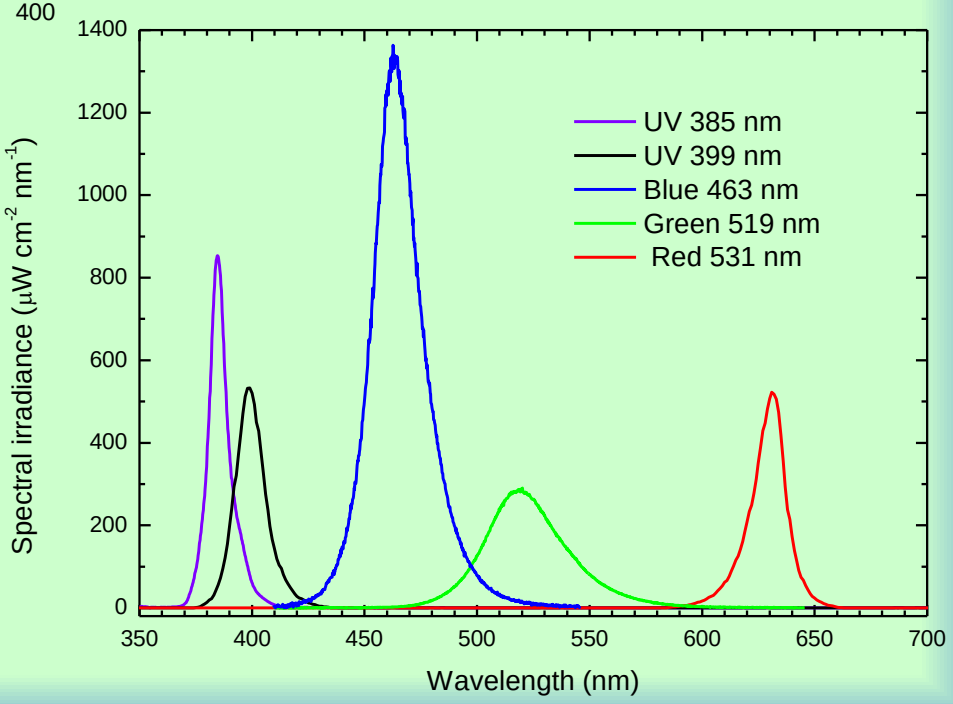
The radiant exposure between the sources differ for a same application, e. g., Photodynamic therapy.



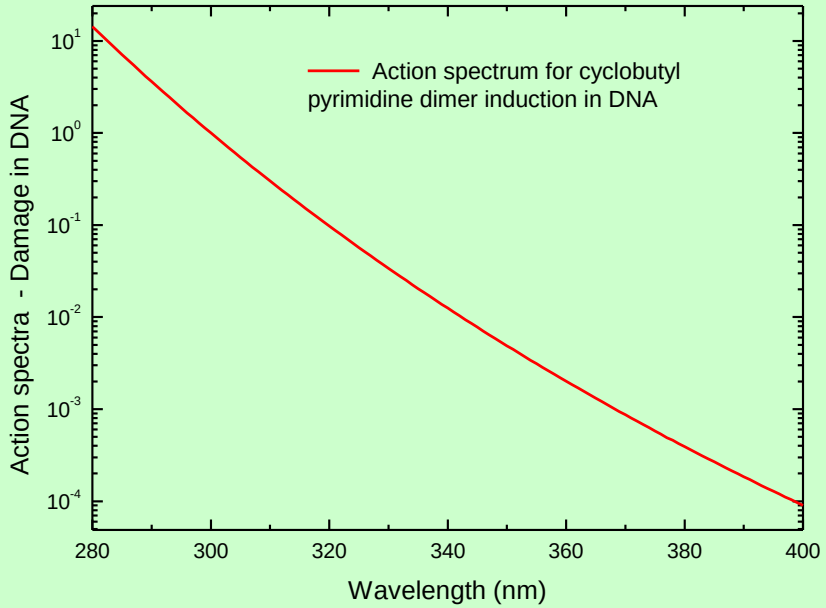


The activities of radiometry conducted in our laboratory cover ultraviolet, visible, and infrared radiation measurements.

Including the characterization of UV lamps, LEDs arrays and laser systems; with applications in medicine, dentistry and agriculture.



Aspergillus nidulans and Metarhizium anisopliae and other fungi as alternatives to chemical insecticides



Necessity of Action spectrum

UV spectral region (280-400nm) Currently is employed an action spectra for DNA damage

Reference: F. E. QUAITE, B. M. SUTHERLAND & J. C. SUTHERLAND. Action spectrum for DNA damage in alfalfa lowers predicted impact of ozone depletion Nature 358, 576 - 578 (1992); doi:10.1038/358576a0

Grasshopper killed by an Alberta isolate of the entomopathogenic (insect-infecting) fungus *Metarhizium anisopliae* *Source: http://people.uleth.ca/~dan.johnson/dcar.htm*

Instrumentation for action spectrum acquisition in the *280-400 nm spectral region*

Xenon Lamp - 1000 W

Source: Newport.com

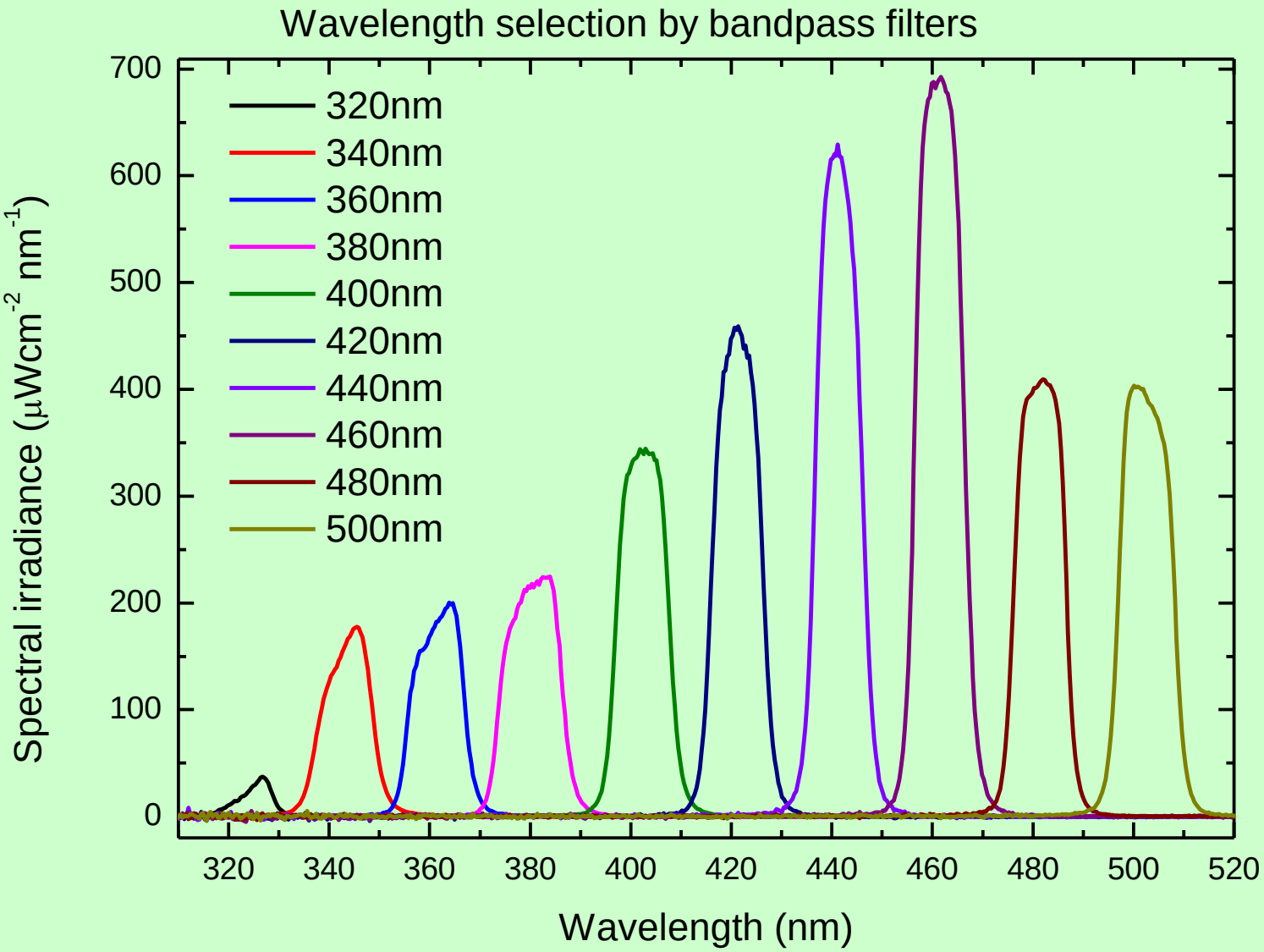
***Aspergillus nidulans and Metarhizium anisopliae* cultures**

Source: cientia.blog.br

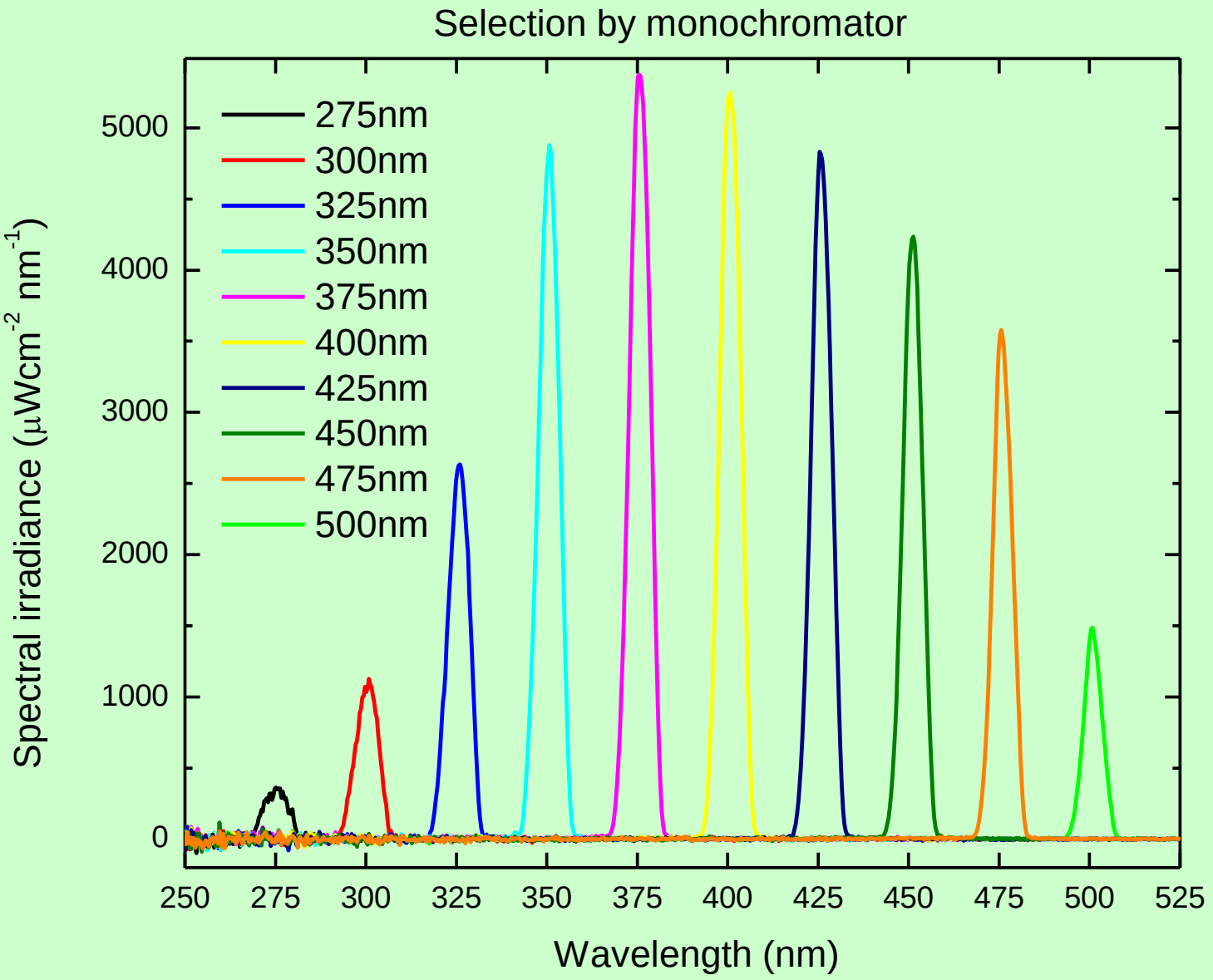
Spectral irradiance

Source: oceanoptics.com

Xenon lamp – bandpass filters



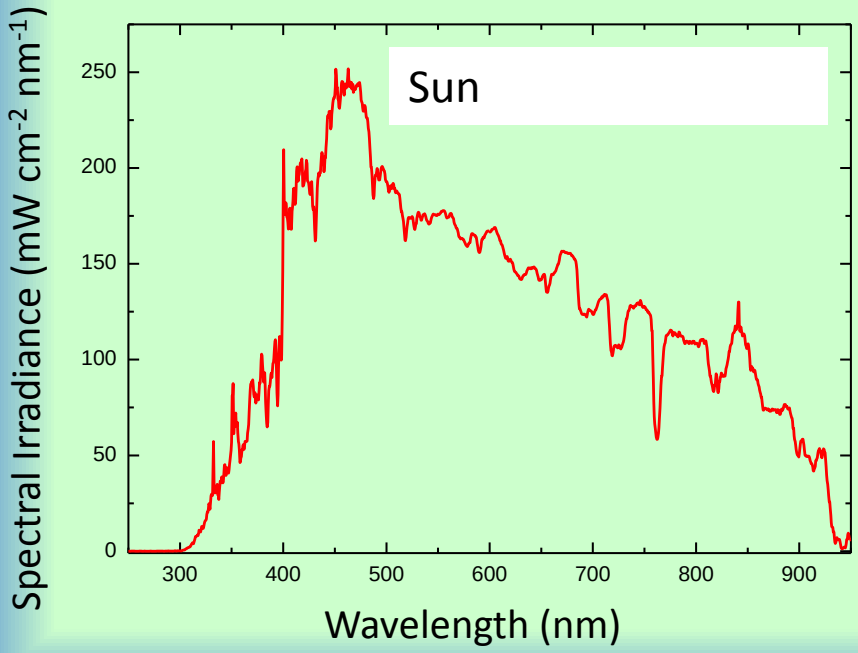
Xenon lamp – monochromator



Photochemistry application

We also research sources for photochemistry application and more recently spectral radiometry of solar ultraviolet radiation, aiming at photodynamic therapy of plant-pathogenic fungi.

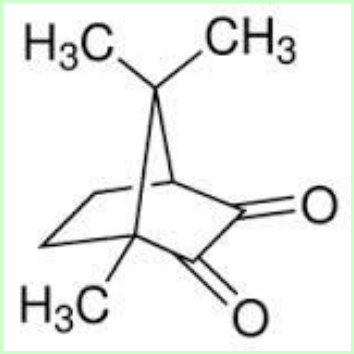
Colletotrichum acutatum Source: wiki.org

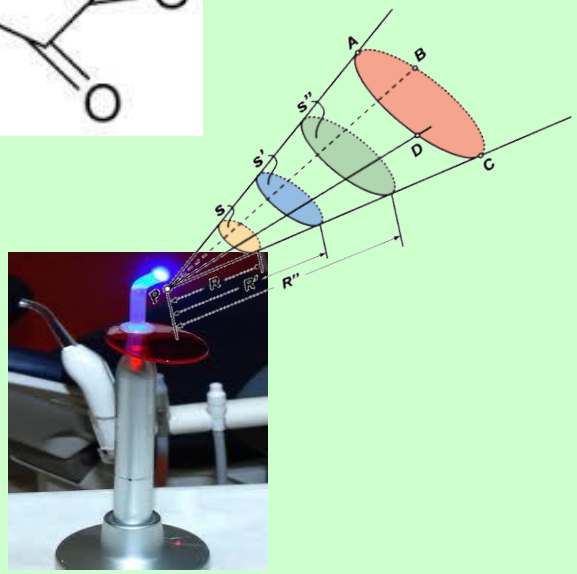


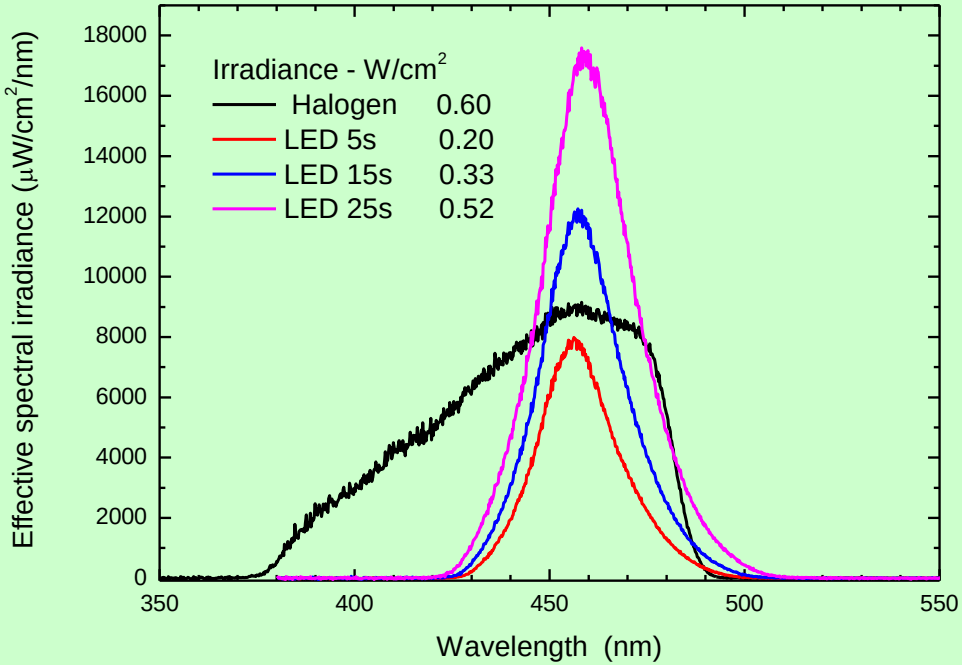
Menezes, H.D. et al. Furocoumarins and coumarins photoinactivate conidia of the plant-pathogenic fungus Colletotrichum acutatum and Aspergillus nidulans under solar radiation, Fungal Genetics and Biology (2013).

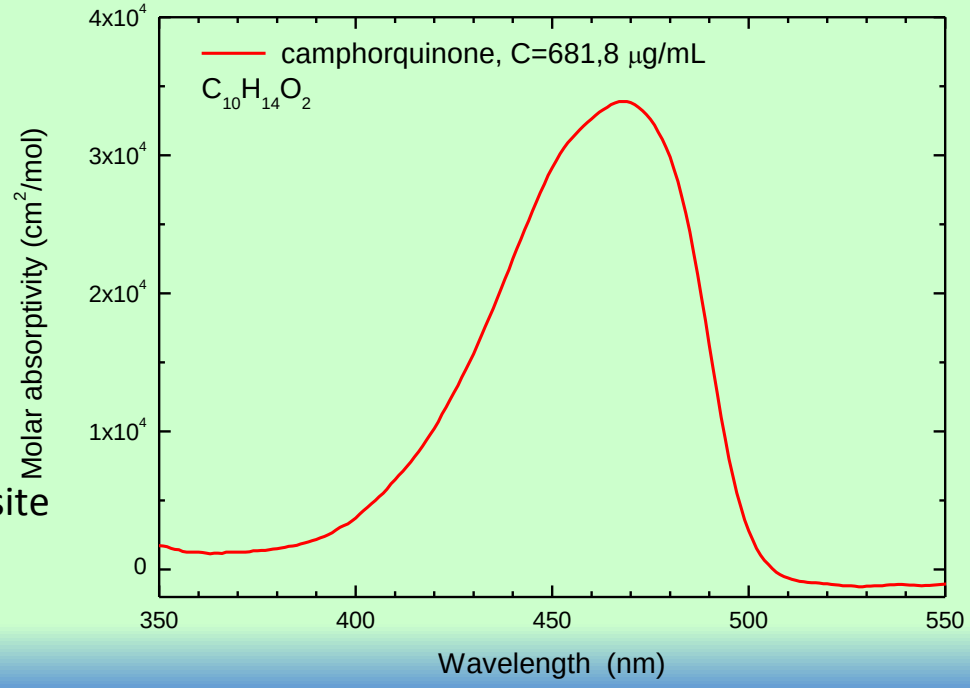
Menezes, H.D. et al. Photodynamic inactivation of the plant pathogenic phytopathogenic fungius Colletotrichum acutatum and Colletotrichum gloeosporioides with novel phenothiazinium photosensitizers, Applied and Environmental Microbiology (2013).

Effective irradiance of dental composite light-curing





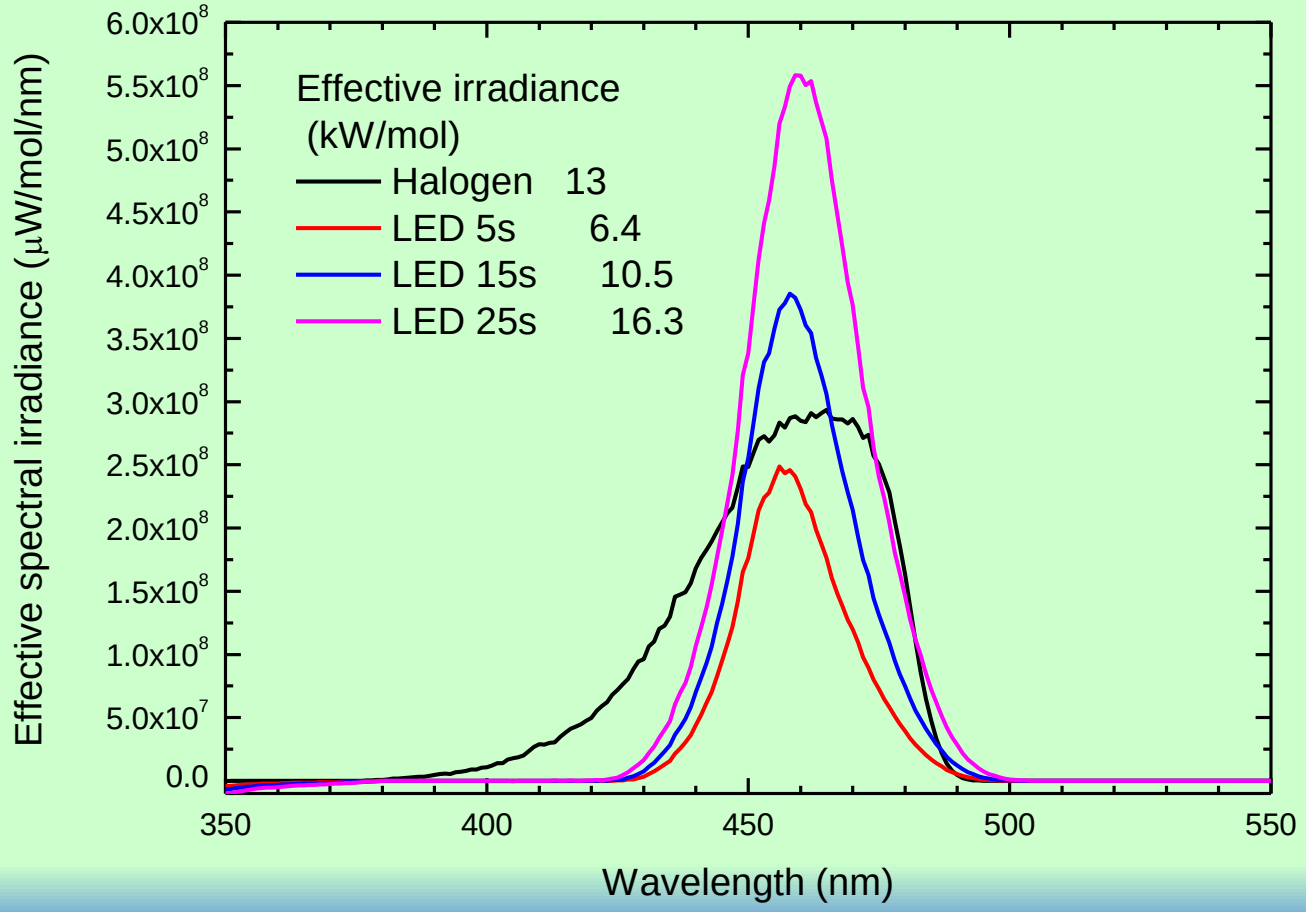




Reference: Lima, FA; Bachmann, L. Spectroradiometry applied to dental composite light-curing.
Applied Spectroscopy Reviews 47:256-271

Effective irradiance of dental composite light-curing

The laboratory explores the effective irradiance [$Wmol^{-1}$]; i.e., determination of the power absorbed per molecule when a source with a certain spectral irradiance [$Wm^{-2}nm^{-1}$] interacts with a substrate of known molar absorptivity [m^2mol^{-1}].



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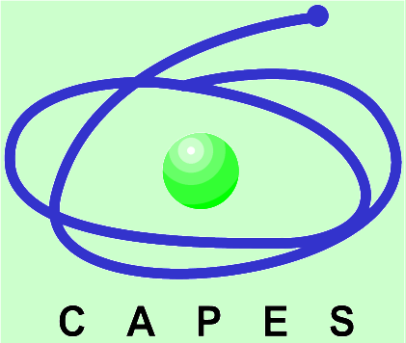

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