Development of a Photosensitive Polymer for Measurement of Damaging Blue Light Exposures

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Abstract
The adverse effects to ocular health caused by exposure to high levels of solar radiation are of great concern and can result in the severe degradation of vision capabilities. Solar radiation in the blue part of the spectrum (effectively 380 to 550 nm) is found to trigger a reaction in the eye and has been characterized by the International Commission on Non-Ionising Radiation Protection as the blue light hazard. This blue light photochemical injury to the human retina is termed photoretinitis. Photoretinitis can result from either viewing an extremely bright light source for a short amount of time or a less bright source for a longer period of time. Excessive exposure to harmful blue light radiation is linked to the increased risk of macular degeneration in humans. Age related macular degeneration is recognised as the leading cause of severe blindness in the Australian population. Protecting the public against excessive blue light radiation has profound implications on public health worldwide. In order to achieve this, quantitative scientific data on the radiation that humans are exposed to during daily activities is required. This necessitates the need to assess the different environments that humans use; in particular those environments that significantly reduce ultraviolet radiation but still allow the majority of blue light to be incident on the human eyes and also those settings where blue light is a major component of the lighting environment. Quantification of the individual level of radiation exposure requires personal dosimetry that takes into account changes in the position and orientation of people compared to the light sources. A prototype photosensitive polymer is currently being developed that can be used for the measurement of blue light exposures to humans. The prototype polymer only responds to wavelengths associated with the blue light hazard and is expected to be a useful tool for measuring radiation associated with the blue light hazard.

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