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The Effect of Irradiation Wavelength on the Discoloration of Wood

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Abstract: Six wood species were exposed to UV and visible light (278 nm to 496 nm) with narrow band gaps (20 nm), and the effects of wavelength on their discoloration patterns were investigated. Light-colored wood specimens ($L^* \geq 70$, $a^* < 8$) underwent photo-darkening and photo-bleaching when exposed to light in the UV and visible range, respectively. The wavelength at which such transition from photo-darkening to photo-bleaching occurred, however, varied among wood species and tended to be longer for softwood than for hardwood. Discoloration patterns of dark-colored wood specimens ($L^* < 70$, $a^* \geq 8$) were much more complicated, whereas these patterns shifted slightly toward those observed for light-colored wood after extraction treatment. There was a tendency for initial color of wood species and their discoloration patterns : the smaller the initial L^* value was, the shorter the wavelength at which the darkening/bleaching transition occurred for L^* ; the larger the initial a^* value was, the shorter the wavelength of the darkening/bleaching transition for a^* ; and there was no obvious tendency for b^* .

Keywords: discoloration, photo-bleaching, photo-darkening, wavelength, wood

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