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Synthesis of a novel camphorquinone derivative having acylphosphine oxide group, characterization by UV-VIS spectroscopy and evaluation of photopolymerization performance

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Abstract:
Camphorquinone (CQ) derivatives having acylphosphine oxide (APO) group are unknown. This study synthesized such a novel 7,7dimethyl-2,3-dioxobicyclo[2.2.1]heptane-1-carbonyldiphenyl phosphine oxide (DOHC-DPPO = CQ-APO). Ultraviolet and visible (UVVIS) spectra of CQ-APO, CQ, and APO were measured. Photopolymerization performances of experimental light-cured resins comprising these photoinitiators were investigated. Newly synthesized CQ-APO showed as a pale yellow crystal (mp 365K). UV-VIS spectrum of CQ-APO showed two maximum absorption wavelengths (λ_{max}) [372 nm (from APO group) and 475 nm (from CQ moiety)] within 350–500 nm. Unfilled resin containing CQ-APO exhibited good photopolymerization time (9.6 sec) and relaxed operation time (50 sec), as well as a pronouncedly lower *b* value (4.0) in the CIELab color specification system than that containing CQ (84.0). Resin composites containing CQ-APO, exhibited high flexural strength (114.3–133.8 MPa). It was concluded that CQ-APO possessed two λ_{max} peaks within 350–500 nm, and that CQ-APO-containing resins exhibited excellent color tone, good photopolymerization reactivity, relaxed operation time, and high mechanical strength.

Key words:
Camphorquinone derivative, Acylphosphine oxide, Photoinitiator

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