Diphenyl functional porphyrins and their metalcomplexes as visible-light photoinitiators for free-radical, cationic and thiol–ene polymerizations

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Photoactive polymers have shown increasing interest in recent years. Indeed, these materials contain photoactive molecules able of producing cytotoxic species under visible light such as reactive oxygen species (ROS). This could allow to kill bacteria in contact with the surface autonomously.

These polymers would be synthesized by photopolymerization, which is generally considered as a more economical and safer chemistry. Indeed, photochemical reactions occur in minutes, at low energy cost, under mild conditions and with few organic solvents. Many types of photoinitiators have already been developed to enable radical or cationic photopolymerization [1], but recently there has been a growing interest in new structures that absorb long wavelengths in the visible-light or near infrared range, such as porphyrin derivatives [2], [3]. Using visible light allows the use of harmless and economic lamps, such as LEDs.

New molecules derived from porphyrin would be synthesized to initiate photopolymerization in the visible range. After polymerization, these photoinitiators would remain trapped in the matrix. Upon irradiation, they could react with oxygen to produce ROS causing bacteria's death.

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