Hybrid photoactivable and antibacterial coatings from bioressources synthesized by photochemistry

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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 allows to kill either bacteria or pollutant in contact with the surface autonomously when irradiated.

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 wavelengths in the visible-light or near infrared range, such as porphyrin derivatives [2-4]. 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 react with oxygen to produce ROS causing bacteria's death and pollutant lysis. This method seems promising against nosocomial infections, since it is very unlikely that bacteria will develop resistance [5].

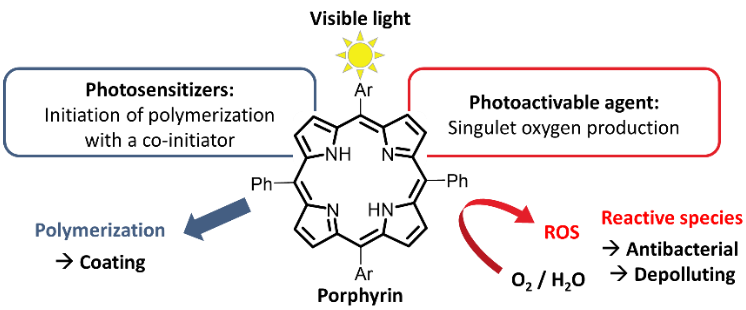

Figure: *Roles of porphyrin in the development and application of the material.*

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