

885 **8. Others Photosensitizers**

886 Benabbou et al. [160] grafted or incorporated into inert solid supports an anthraquinone derivative,
887 9,10-anthraquinone 2-carboxylic acid (ANT) and a benzo-[b]triphenylene-9,14-dicarbonitrile
888 (DBTP), as they are known to be good singlet oxygen generators.

889 The ANT was converted to its triethoxysilyl derivative by condensation with APTES and grafted to
890 commercial silica beads (3–5 mm diameter, pore diameter ca. 9 nm), by reflux in toluene and was
891 shown to be more effective than the DBTP derivatives grafted on a commercial amino
892 functionalized silica powder (Si-NH₂ 40–63 μm particles) when tested against *E. coli*. This may
893 have been due to the higher photo-oxidation efficiency of ANT [161]. Both derivatives displayed a
894 good stability in aqueous suspension, with no leakage of the sensitizing molecule into the water.
895 Commercially available silica powders or beads were chosen because 9, 10-anthraquinone
896 immobilized on silica gel was found to be transparent [162].

897 Chen et al. studied the ability of chitosan to potentiate the activity of erythrosine (ER) against
898 bacteria and yeast through the preparation of nanoparticles by the ionic gelation method.

899 Comparing the PACT effect against erythrosine alone and chitosan alone, the combination of ER/
900 CS nanoparticles showed an enhanced antimicrobial effect against *S. mutans*, *P. aeruginosa* and *C.*
901 *albicans* [163].

902 Neutral and cationic pyrrolidine fused chlorins have also been investigated recently as potential
903 PACT agents when immobilized on 3-bromopropyl-functionalized silica and Merrifield resin [164].
904 Since it had been observed from the same research group that the efficiency in the photoinactivation
905 of *E. coli* was influenced by the number of charges on the final immobilized conjugate [165] further
906 treatments with 1-methylimidazole or pyridine were performed on silica gel and on Merrifield resin
907 to increase the number of positive charges on the surface of the material.

908 Overall, this study showed that the increased number of positive charges and their dispersion on the
909 surface of the materials strongly influences the photodynamic efficiency of the conjugate.

910 Silica with chlorin and Merrifield resin/chlorin in combination with pyridine showed the best
911 activity against *E. coli*.

912

