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Title: Light-induced Surface Graft Polymerizations Initiated by An Anthraquinone Dye on Cotton Fibers

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1 **Light-induced Surface Graft Polymerizations Initiated by An**

2 **Anthraquinone Dye on Cotton Fibers**

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6 **ABSTRACT**

7 Anthraquinone and its derivatives could serve as photo-sensitizers and generate radicals and
8 reactive oxygen species in polymers under exposure of UVA or day light. Such a property was
9 utilized in development of novel light-induced surface radical graft polymerizations on cotton
10 fibers that were dyed with an anthraquinone derivative, 2-ethylanthraquinone. Several functional
11 monomers were directly grafted onto the dyed cotton fibers upon UVA exposure. The chemical
12 and morphological structures and thermal properties of the grafted fibers were confirmed and
13 characterized by Fourier transform infrared spectrometer (FTIR), scanning electron microscope
14 (SEM) and thermal gravimetric analysis (TGA). Reaction conditions including concentrations of
15 the photosensitizer, the amount of monomers, as well as UVA irradiation time could influence
16 grafting efficiencies. More interestingly, the surface graft polymerization did not significantly
17 change the light active functions of the agent, evidenced by the light-active antimicrobial
18 functions of the grafted fibers.

19 **Keywords:** Anthraquinone compounds; Light-induced grafting; Free-radical polymerization; Vat
20 dye; Cotton fabric; Antimicrobial function.

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