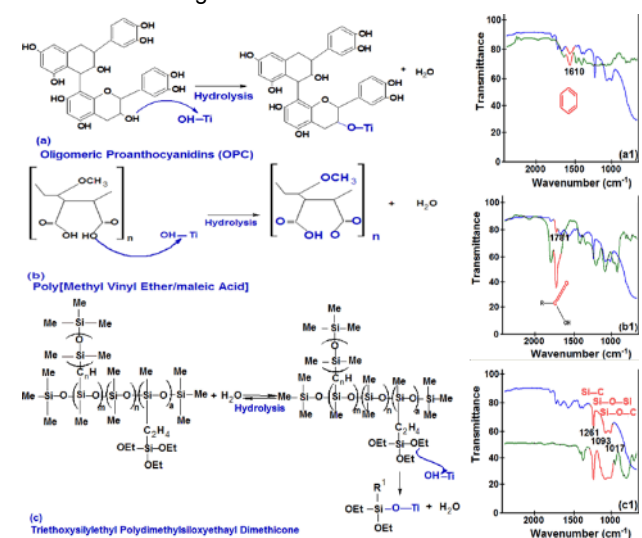


particles used in this experiment.

Supporting Information Available:

Scheme 1 shows the proposed mechanism for binding the antioxidant, anionic polymer, and the dimethicone derivative polymers to the TiO₂ nanoparticles. FTIR analysis was performed on the solution after each step in the reaction. The blue trace in the corresponding FTIR spectra corresponds to the spectra associated with the nanoparticles after thorough washing of excess solution, while the lower green spectra is obtained from the pure antioxidant or polymer molecules. In each case, we see that the appropriate step was successful and the molecules remained bound to the nanoparticle surface even after centrifugation.



Scheme 1 (a) Chemical reaction pathway of the Oligomeric Proanthocyanidins (OPC) with TiO₂ nanoparticles. (b) Chemical reaction pathway of the poly[methyl Vinyl Ether/maleic acid] with TiO₂ nanoparticles. (c) Chemical reaction pathway of the Triethoxysilylethyl Polydimethylsiloxyethyl Dimethicone with TiO₂ nanoparticles. (a1) green curve (raw material) vs. blue curve (surface modified TiO₂ #2). The green curve corresponds to pure Oligomeric Proanthocyanidins (OPC), which is a molecule with six benzene rings. The red line highlights the key component corresponding to the benzene ring absorption peak at 1610 cm⁻¹. (b1) the presence of the anionic polymer is confirmed by the presence of the carboxylic acid absorption peak at 1781cm⁻¹. (c1) the green line shows the presence of silicone derivative peaks at 1261, 1093, and 1017 cm⁻¹. This confirms that the silicone derivative has reacted and attached to TiO₂ with the red line highlighting the key component Figure 2 Surface electrophoresis of λ DNA, fluorescence intensity plotted as a function of time. (a) Control, unexposed sample. (b) λ-DNA exposed to UVC for 1 hour (c) λ-DNA

| | MW (g/mole) | pH | Density (ρ) |
|-----------------------------|-------------|-----|------------------------|
| Hydrophobic Polymer | 4000 | - | 0.96g/cm ³ |
| Antioxidant (OPC) | 582.59 | 2.1 | 1.021g/cm ³ |
| Anionic Polymer | 155.1696 | 2.8 | 1.017g/cm ³ |
| TiO ₂ | 79.9 | - | 4.23 g/cm ³ |
| Functional TiO ₂ | - | - | 0.98 g/cm ³ |

Table 1: Characteristic parameters of the polymers and TiO₂