Supporting Materials

# Low-Cost Photo-Responsive Nanocarrier Platform by One-Step Functionalization of Flame-made Titania Agglomerates with L-lysine

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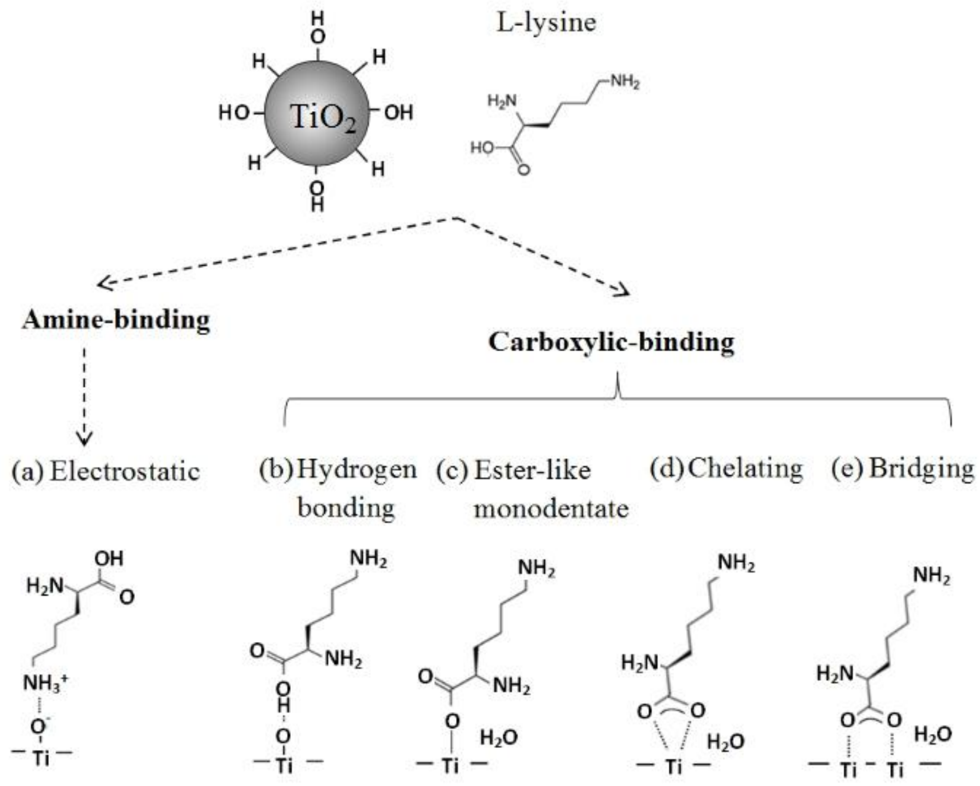


**Figure S1.** Binding of L-lysine on $TiO_2$ nanoparticles. Three main bonding configurations are expected: (a) electrostatic interaction with protonated amine; adsorption of carboxylic group via (b) hydrogen-bonding; (c) ester-like monodentate; (d) bidentate chelating; and (e) bridging. Adapted from [21].

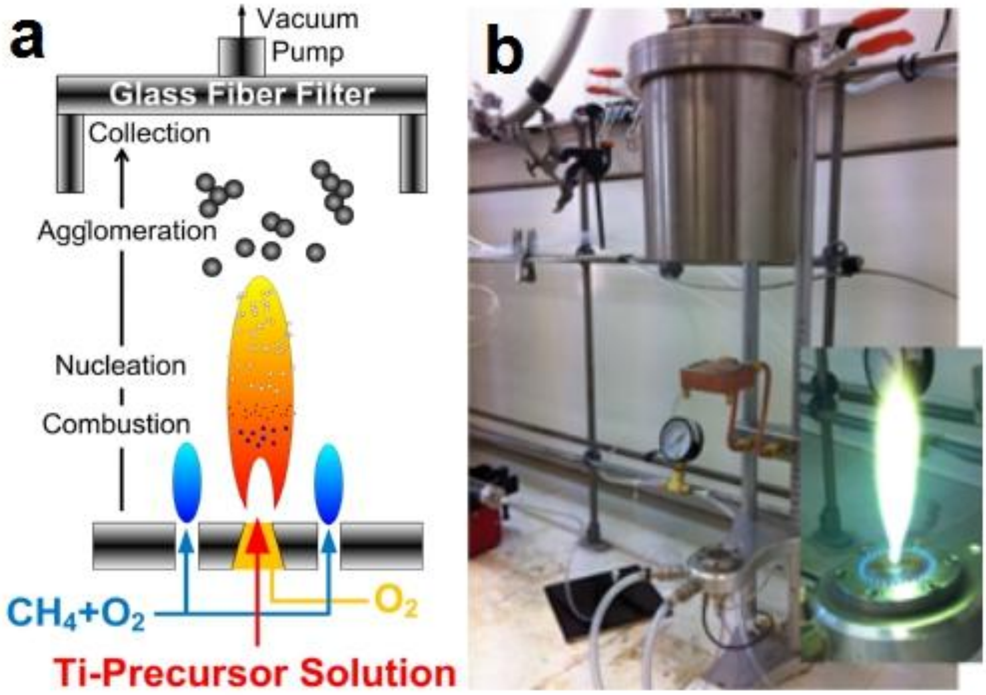


**Figure S2.** (a) Schematic and (b) photograph of flame spray pyrolysis burner at the Nanotechnology Research Laboratory, ANU, utilized for the synthesis and collection of $TiO_2$ nanostructured powders.

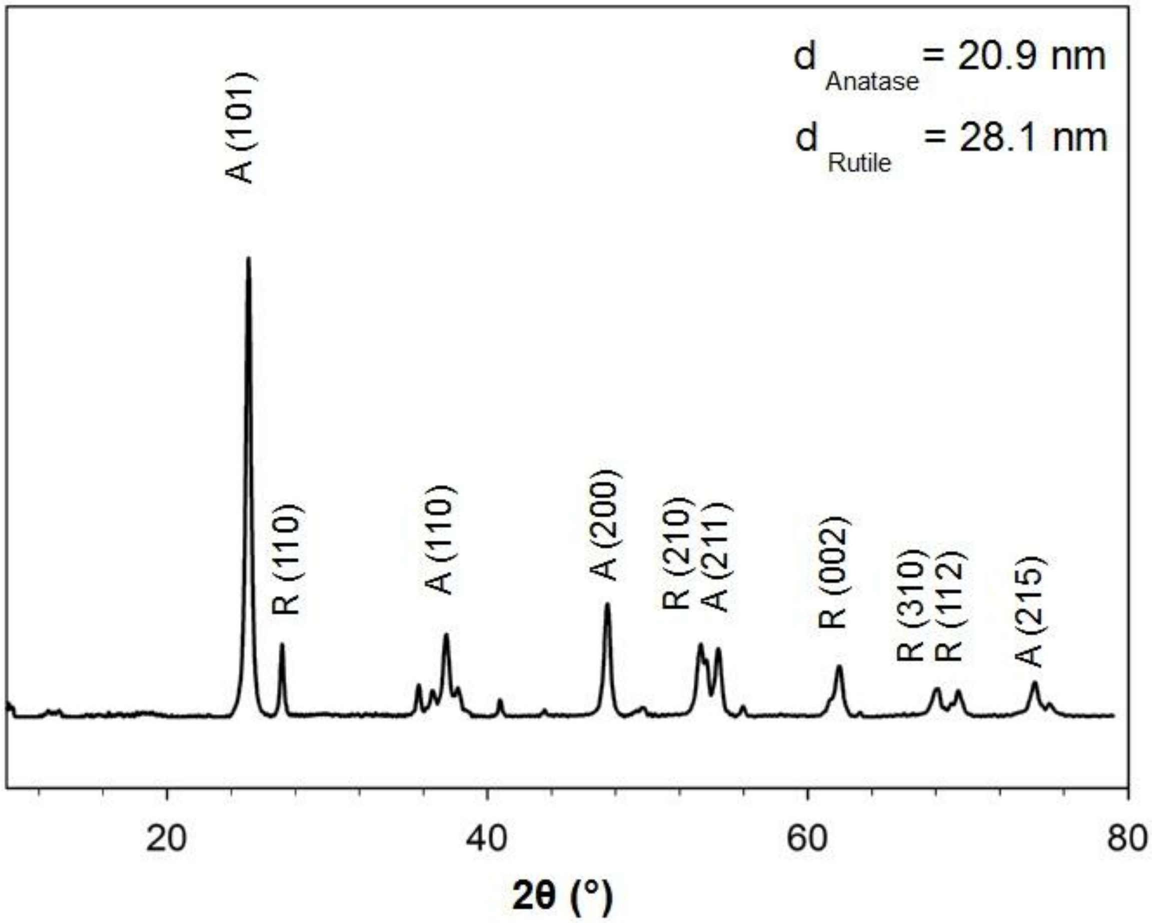


**Figure S3.** XRD spectrum of flame-made $TiO_2$ nanoparticles showing anatase (A) and rutile (R) peaks.

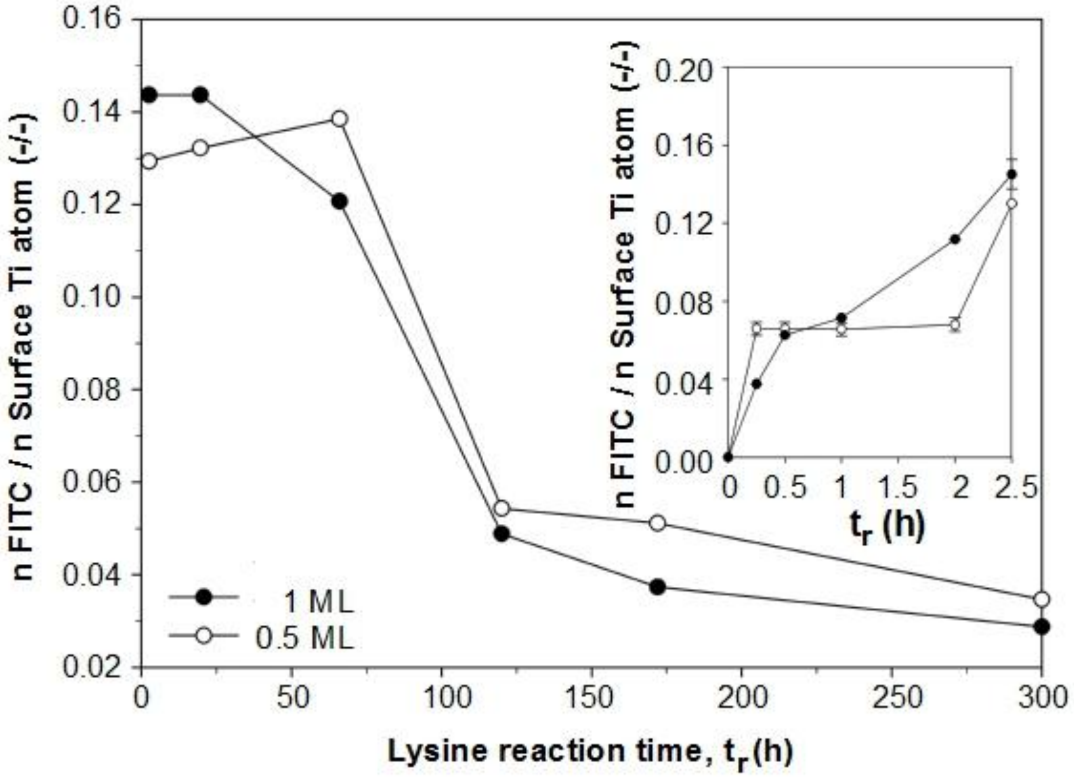


**Figure S4.** Calculated ratio between theoretical surface Ti atom and FITC loading for 1ML (solid circle) and 0.5 ML (empty circle) lysine concentration across different reaction times and (inset) magnification of the first 2.5 h.

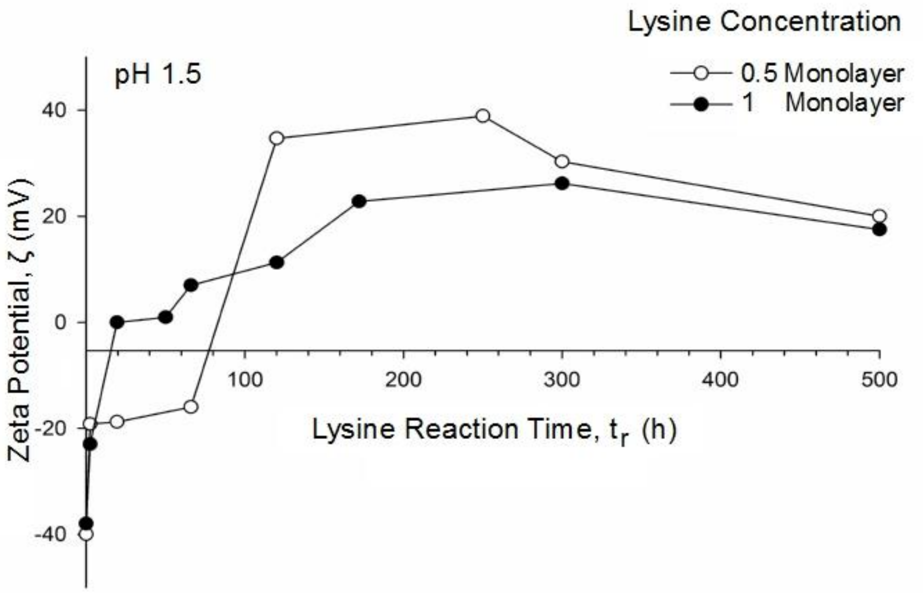


**Figure S5.** Zeta potential of conjugated $TiO_2$ nanoparticles as a function of reaction time ($t_r$) at a pH of 1.5, for a lysine concentration of 0.5 ML (empty circles) and 1 ML (solid circles).

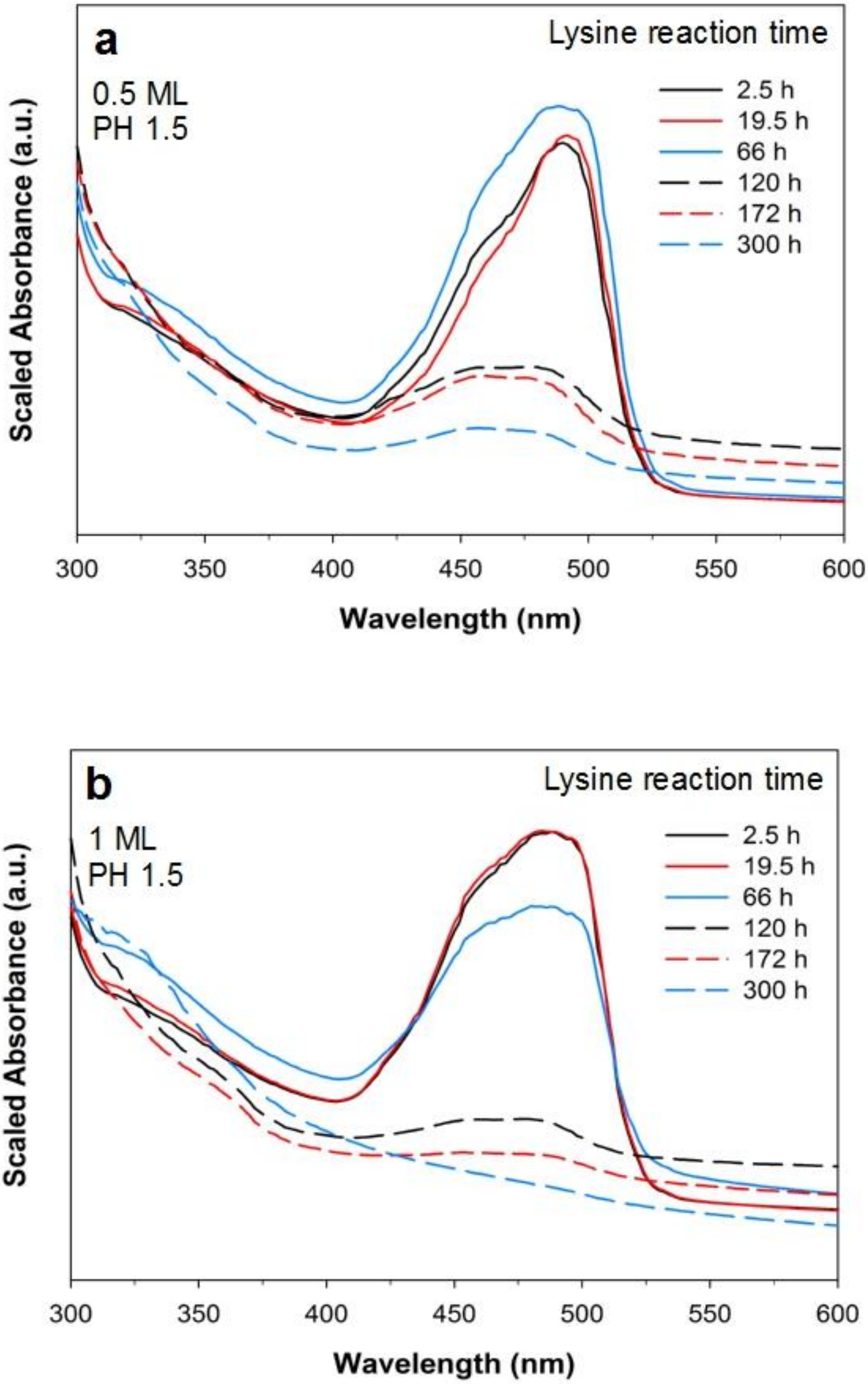


**Figure S6.** Optical absorbance spectra of acidic functionalised (pH 1.5) FITC-Lysine-$TiO_2$ for a) 0.5 ML and b) 1 ML lysine concentration.

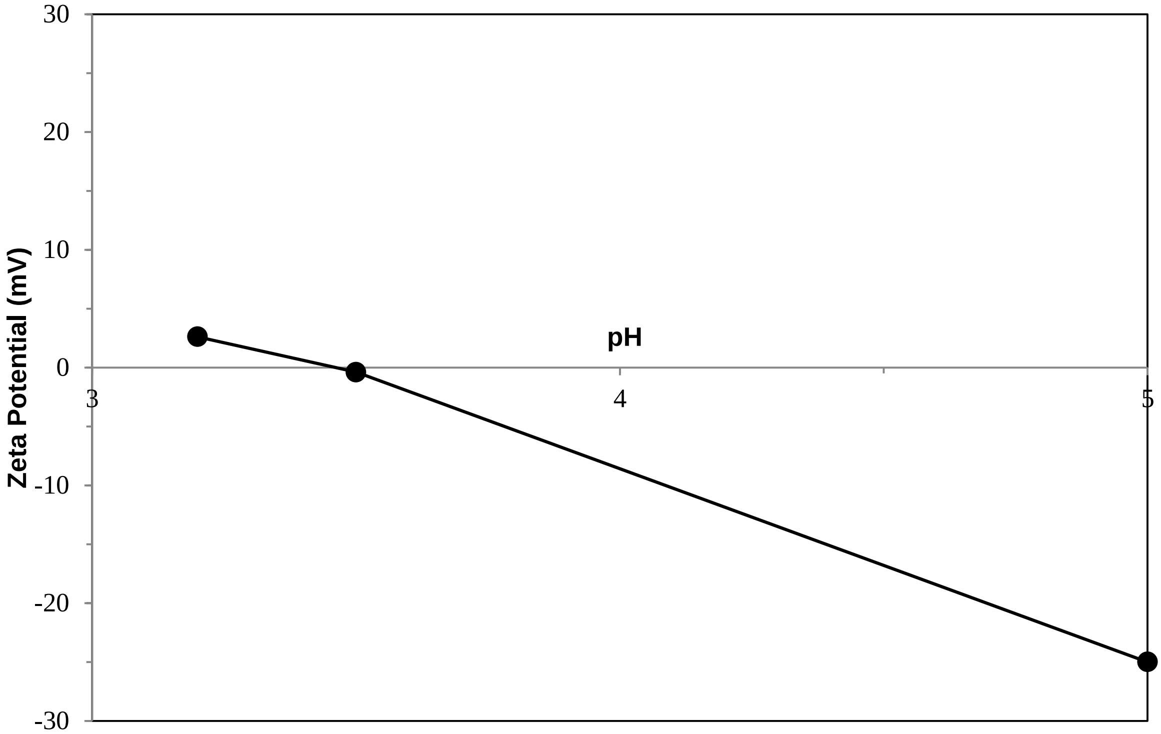


**Figure S7.** Isoelectric point of as-prepared flame-made $TiO_2$ from auto-titration.