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ARTICLE

New Approach of Modifying the Anatase to Rutile Transition Temperature in TiO_2 Photocatalysts

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Supplementary Information

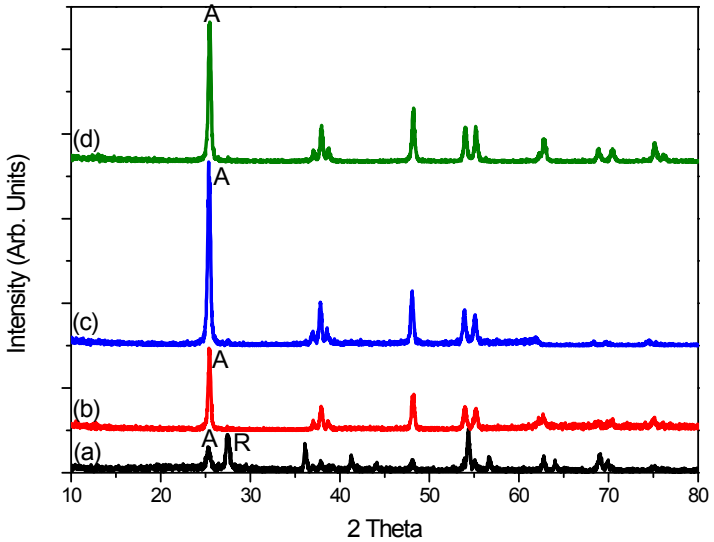

Figure S1: XRD of all concentrations that have been calcined at 600 °C. (a) Undoped TiO_2 (b) 1:1 TiO_2: Benzoic Acid (c) 1:4 TiO_2: Benzoic Acid and (d) 1:8 TiO_2: Benzoic Acid. A= anatase and R = rutile.

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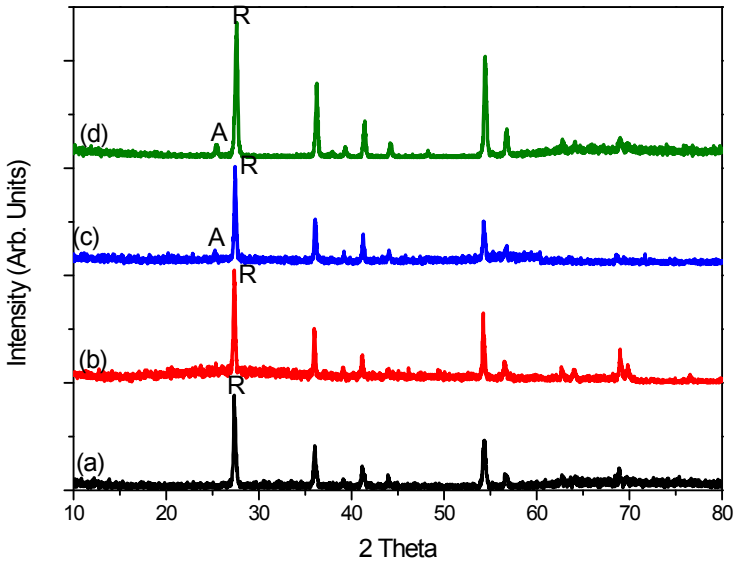

Figure S2: XRD of all samples which have been calcined at 800 °C. (a) Undoped TiO_2 (b) 1:1 TiO_2: Benzoic Acid (c) 1:4 TiO_2: Benzoic Acid and (d) 1:8 TiO_2: Benzoic Acid. A= anatase and R = rutile

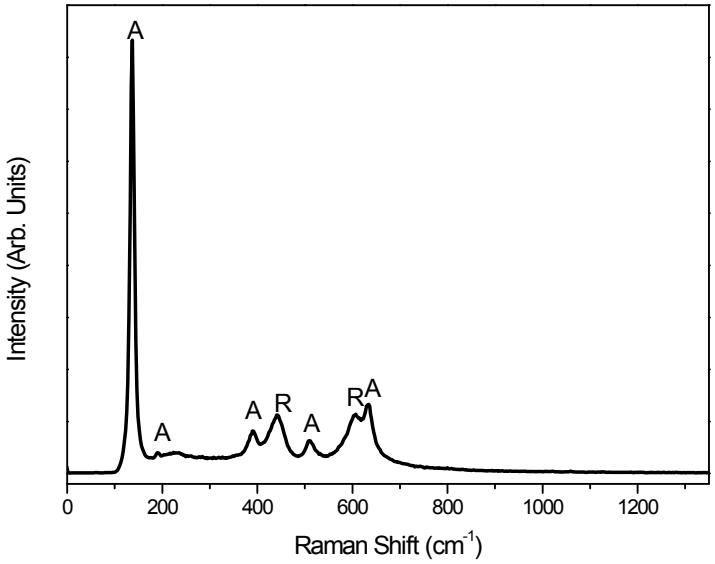

Figure S3: Raman spectra of the 1:1 TiO_2: benzoic acid sample calcined at 700 °C, A = anatase and R = rutile

Table S1: XPS results showing the binding energies (eV) for samples at 600 °C, 700 °C and 800 °C

	Control	1:1	1:4	1:8
C_{1s}	600 °C – 285.0 700 °C – 285.0 800 °C – 285.0	600 °C – 285.0 700 °C – 285.0 800 °C – 285.0	600 °C – 285.0 700 °C – 285.0 800 °C – 285.0	600 °C – 285.0 700 °C – 285.0 800 °C – 285.0
O_{1s}	600 °C – 530.2 700 °C – 529.8 800 °C – 530.0	600 °C – 530.2 700 °C – 530.0 800 °C – 529.8	600 °C – 530.2 700 °C – 530.2 800 °C – 530.0	600 °C – 530.0 700 °C – 529.8 800 °C – 529.8
Ti_{2p}	600 °C – 459.0 700 °C – 458.8 800 °C – 458.6	600 °C – 459.0 700 °C – 458.8 800 °C – 458.6	600 °C – 459.0 700 °C – 458.8 800 °C – 458.8	600 °C – 458.8 700 °C – 458.6 800 °C – 458.6

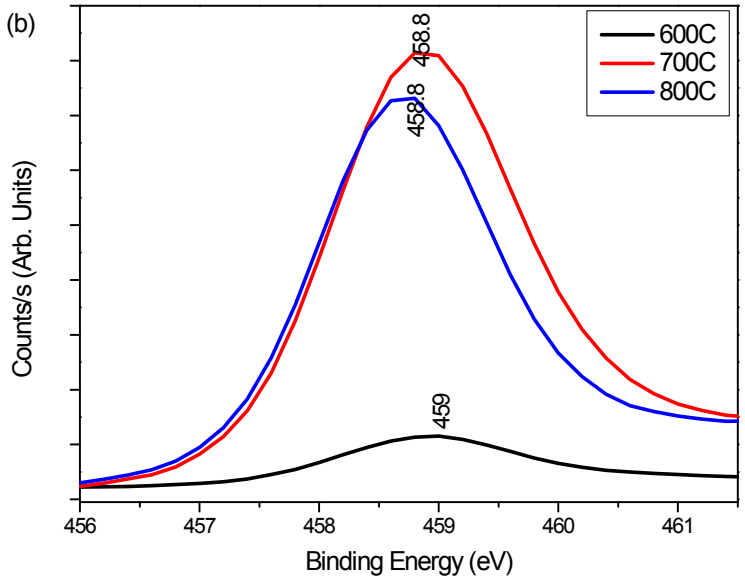

Figure S4: XPS of 1:4 TiO_2: benzoic acid at 600 °C, 700 °C and 800 °C for $Ti_{2p\ 1/2}$

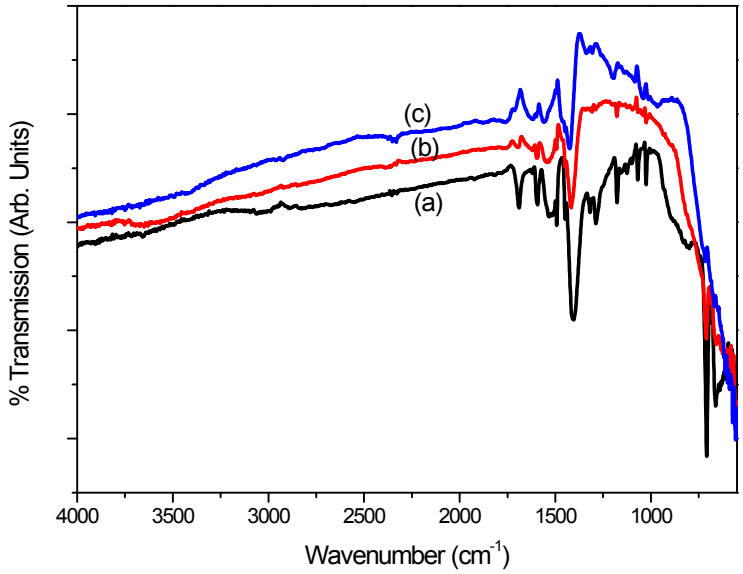

Figure S5: FTIR spectra of the 1:4 TiO_2: benzoic acid for (a) uncalcined, (b) 500 °C and (c) 900 °C

All 1:8 samples contained very weak Ti-O-Ti peaks, uncalcined at 556cm^{-1}, 500 °C at 530cm^{-1} and 900 °C at 534cm^{-1}. The uncalcined and 500 °C samples both showed the presence of benzene ring(s), with a medium peak at 1036cm^{-1} for uncalcined and a weak peak at 1025cm^{-1} for the sample calcined to 500 °C. There is also a peak at 1287cm^{-1} in the uncalcined sample for a carboxyl group (COOH) and one at 1319cm^{-1} that indicates the presence of C-OH and is not present in the other samples. The uncalcined sample contains a strong C-O symmetric stretch (1403cm^{-1}), while 500 °C shows a medium C-O symmetric stretch (1416cm^{-1}) and at 900 °C a very weak C-O symmetric stretch (1427cm^{-1}). There are vibrations of carboxylate moieties at 500 °C (1538cm^{-1}). There are also peaks that show asymmetric C-O stretches, for uncalcined at 1590cm^{-1} and 1690cm^{-1} (medium) and for 500°C at 1590cm^{-1} and 1690cm^{-1} (weak).

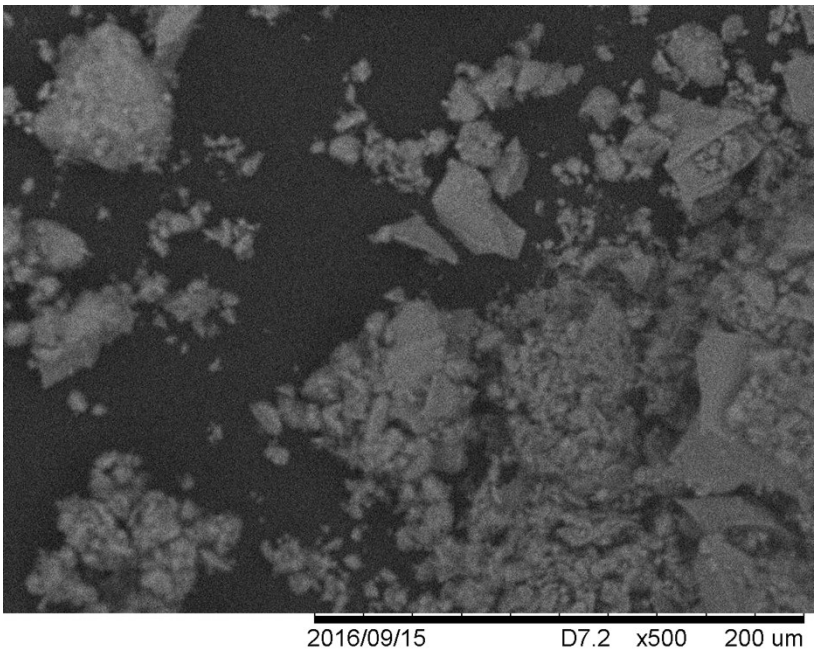

Figure S6: SEM of 1:4 TiO_2: benzoic acid @ 500°C