

Supplementary Information

Surface Modification and Spectroscopic Characterization of TiO₂ Nanoparticles with 2-Aminoethyl Dihydrogen Phosphate

Effat Iravani,^{*a} Sareh A. Allahyari,^a Zahra Shojaei^b and Meisam Torab-Mostaedi^a

^aNuclear Science & Technology Research Institute, P.O. Box 11365-8486 Tehran, Iran

^bDepartment of Chemical Engineering, Faculty of Engineering, Tehran University, P.O. Box 11365-4563 Tehran, Iran

AP-nano TiO₂

IR (KBr) ν / cm^{-1} 3772, 3714, 3411, 2925, 2362, 1629, 1465, 1394, 1269, 1168, 1130, 1074; ATR-FTIR (ZnSe crystal) ν / cm^{-1} 3796, 3674, 2926, 2858, 2357, 1587, 1464, 642; ¹H MAS NMR (400 MHz, solid state) δ 9.64 (s, nH, adsorbed H₂O, surface OH groups, probably NH₂ & P-

OH); ¹³C CP/MAS NMR (500 MHz, solid state) δ 41.48 (broad, N-CH₂), 58.12 (broad, O-CH₂); ³¹P MAS NMR (400 MHz, Solid state) δ 2.11 (s, P-O-Ti), -11.69 (s, probably dissolution-precipitation product); CHN AP-nano TiO₂ found wt. %: C, 0.539; H, 0.253; N, 0.356; TGA 3.73% weight loss at 900 °C.

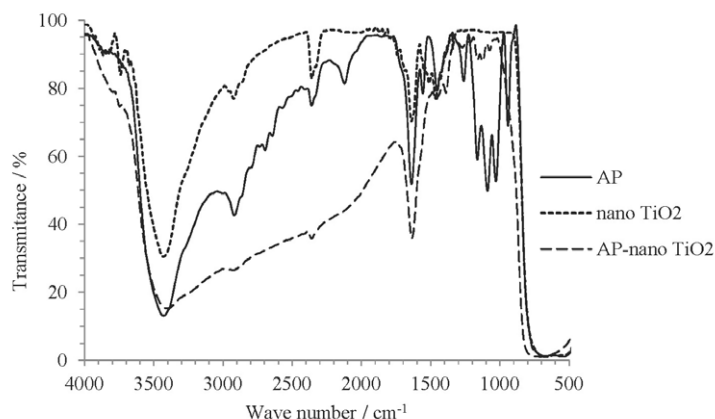


Figure S1. FTIR spectra (KBr) of AP, nano TiO₂ and AP-nano TiO₂.

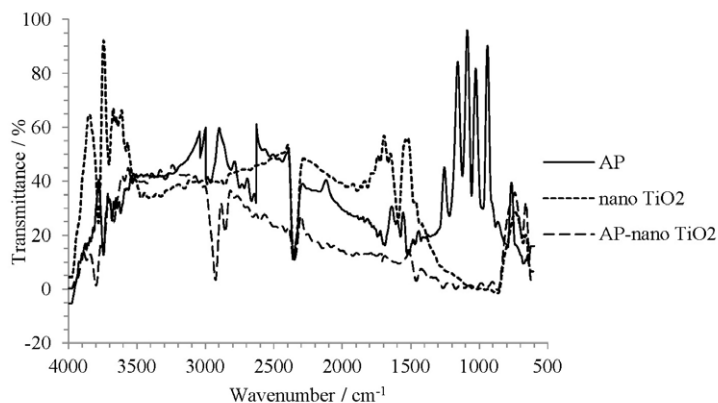


Figure S2. ATR-FTIR spectra (ZnSe) of AP, nano TiO₂, AP-nano TiO₂.

*e-mail: iravanieffat@yahoo.de

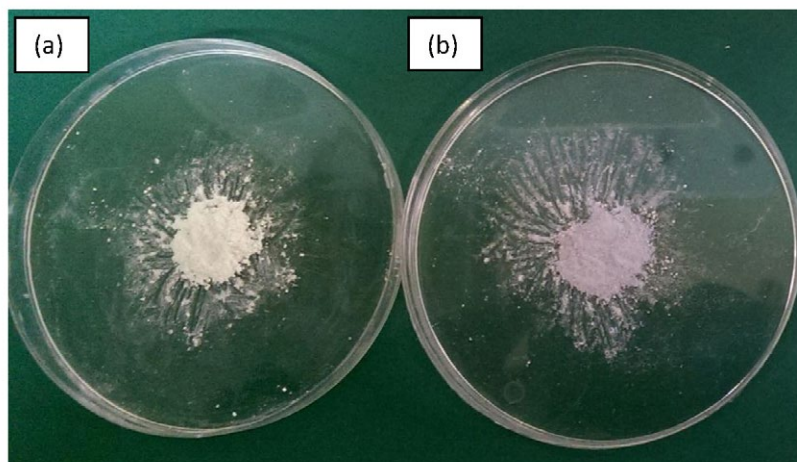


Figure S3. The result of ninhydrin dye test after soaking the specimens in the prepared ninhydrin solution and drying at room temperature: (a) nano TiO₂ as reference showed no color change and (b) the color of AP-nano TiO₂ changed to violet.

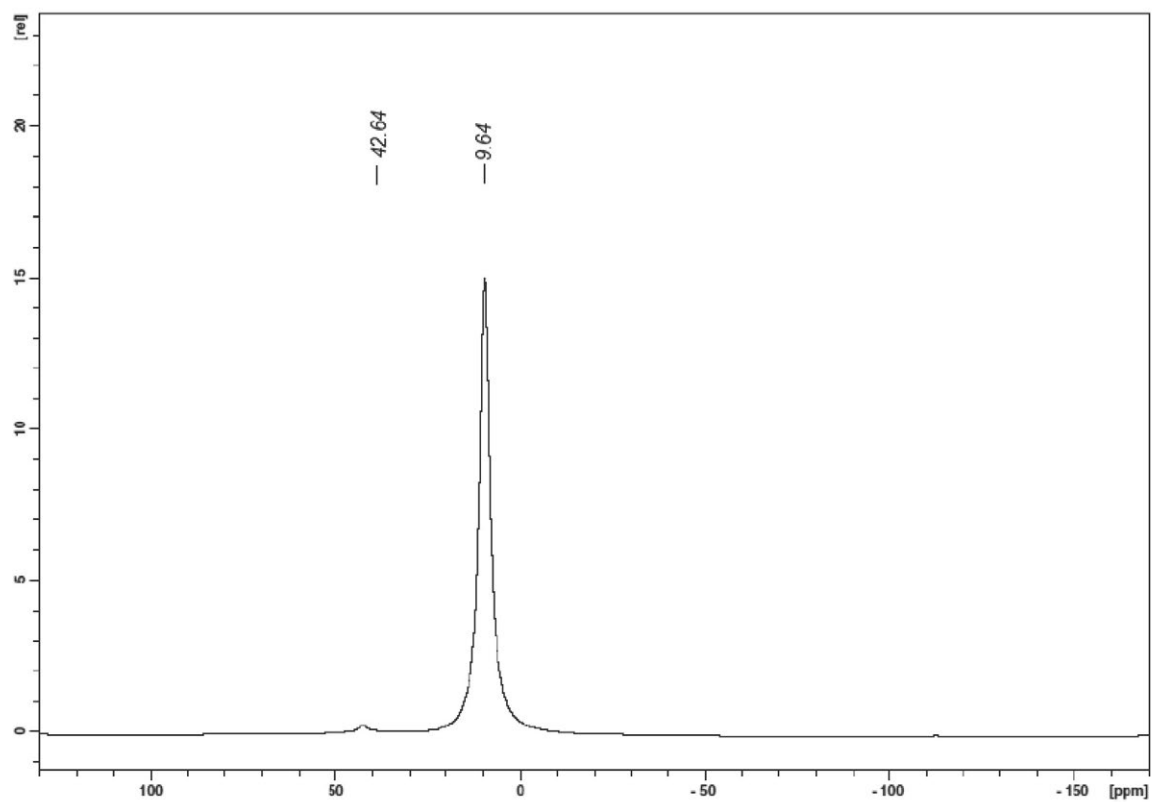


Figure S4. ¹H MAS NMR spectrum (400 MHz, solid state) of AP-nano TiO₂.

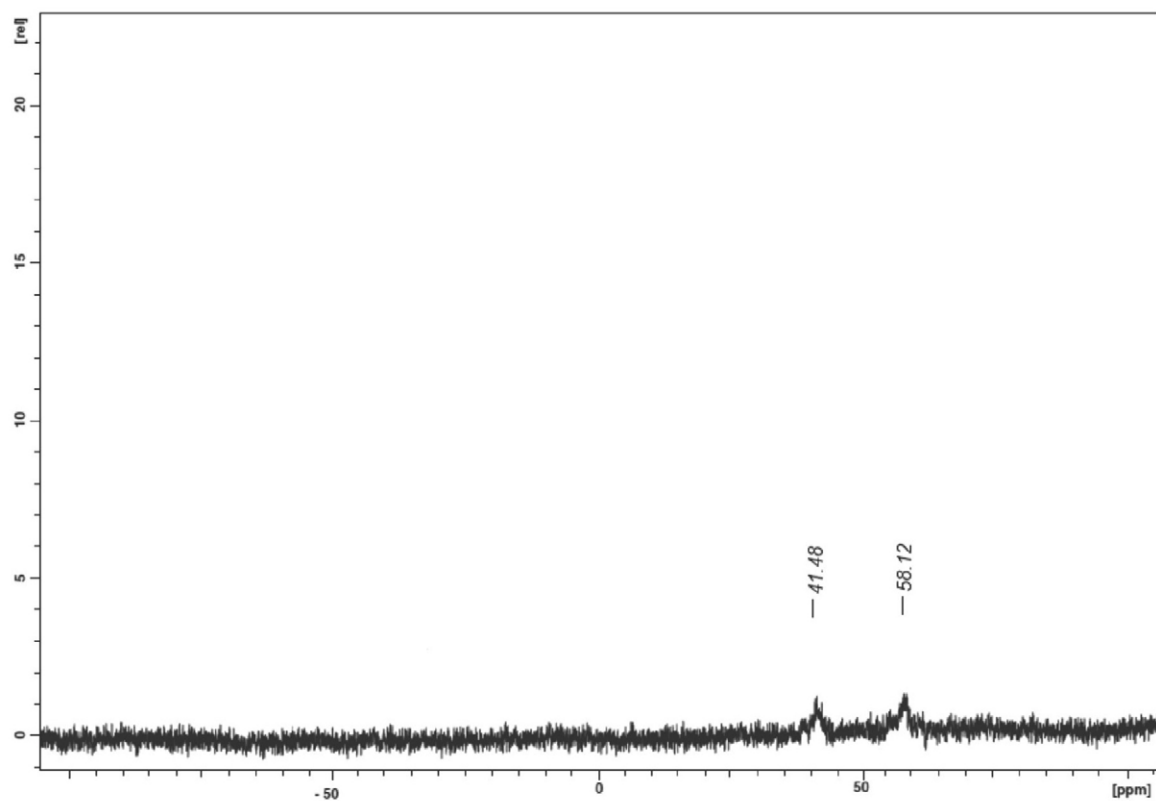


Figure S5. ^{13}C CP/MAS NMR spectrum (500 MHz, solid state) of AP-nano TiO_2 .

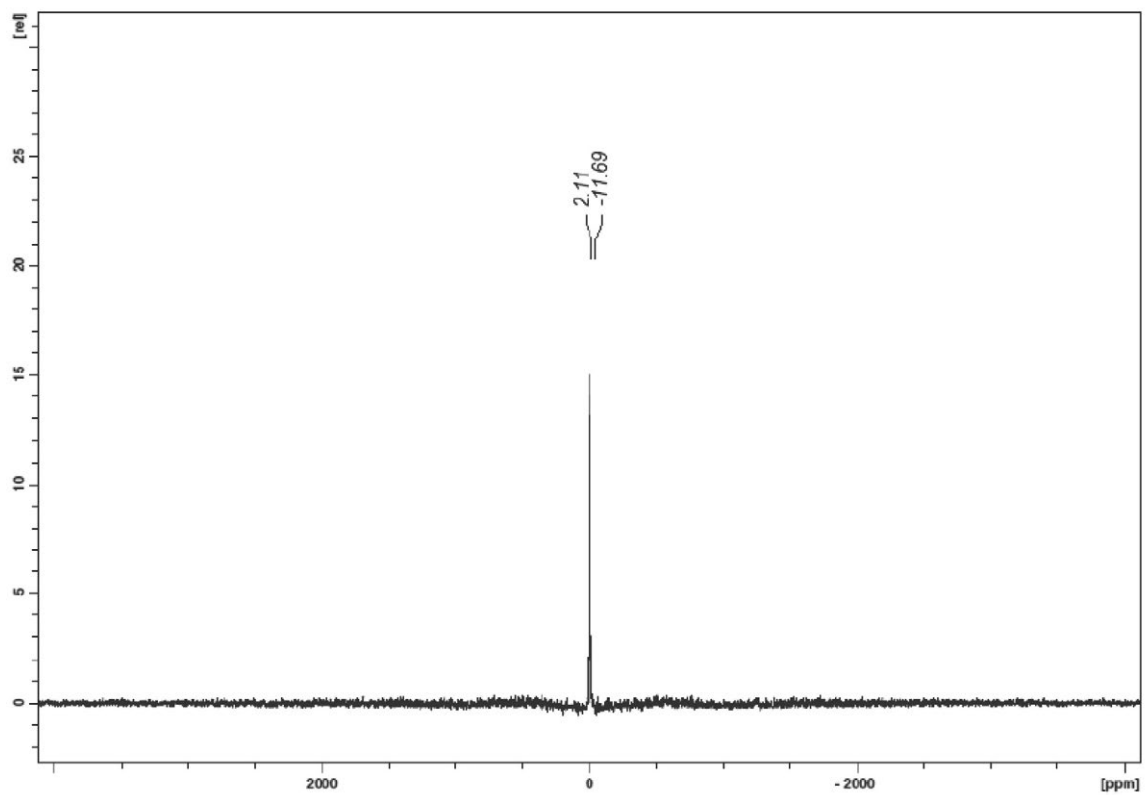


Figure S6. ^1H coupled ^{31}P MAS NMR spectrum (400 MHz, solid state) of AP-nano TiO_2 .

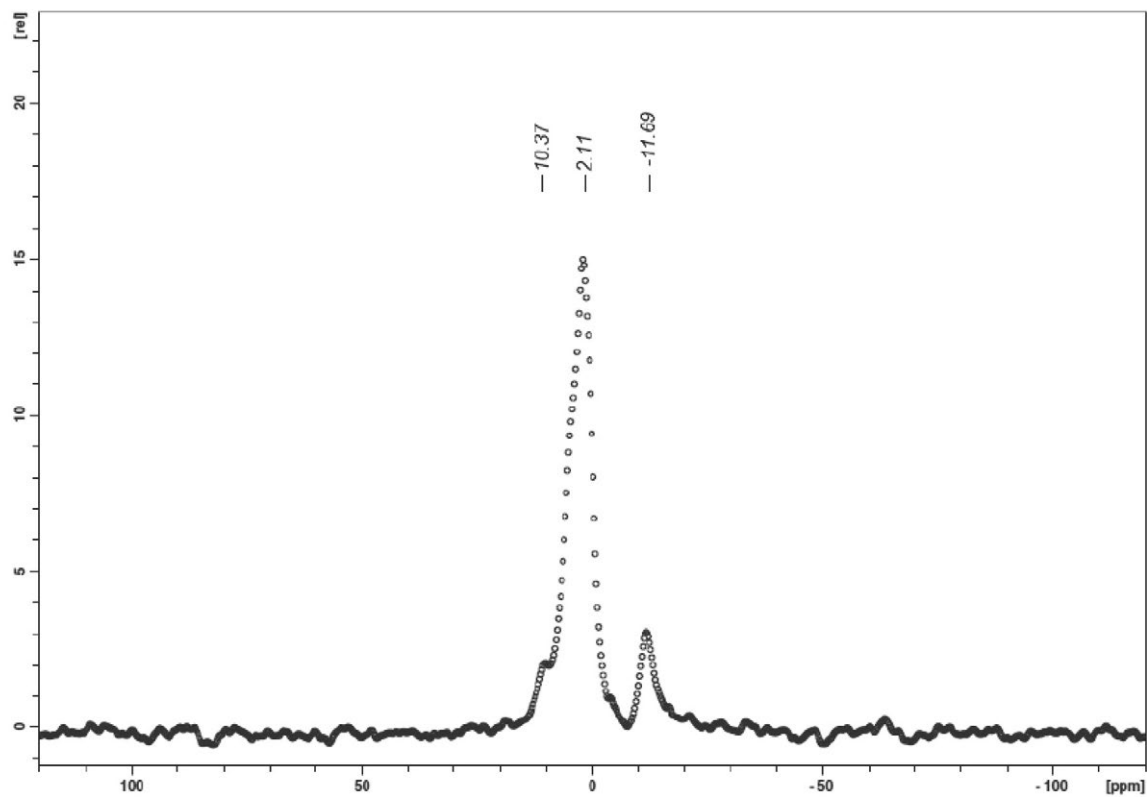


Figure S7. ¹H coupled ³¹P MAS NMR spectrum (400 MHz, solid state) of AP-nano TiO₂ (expanded).

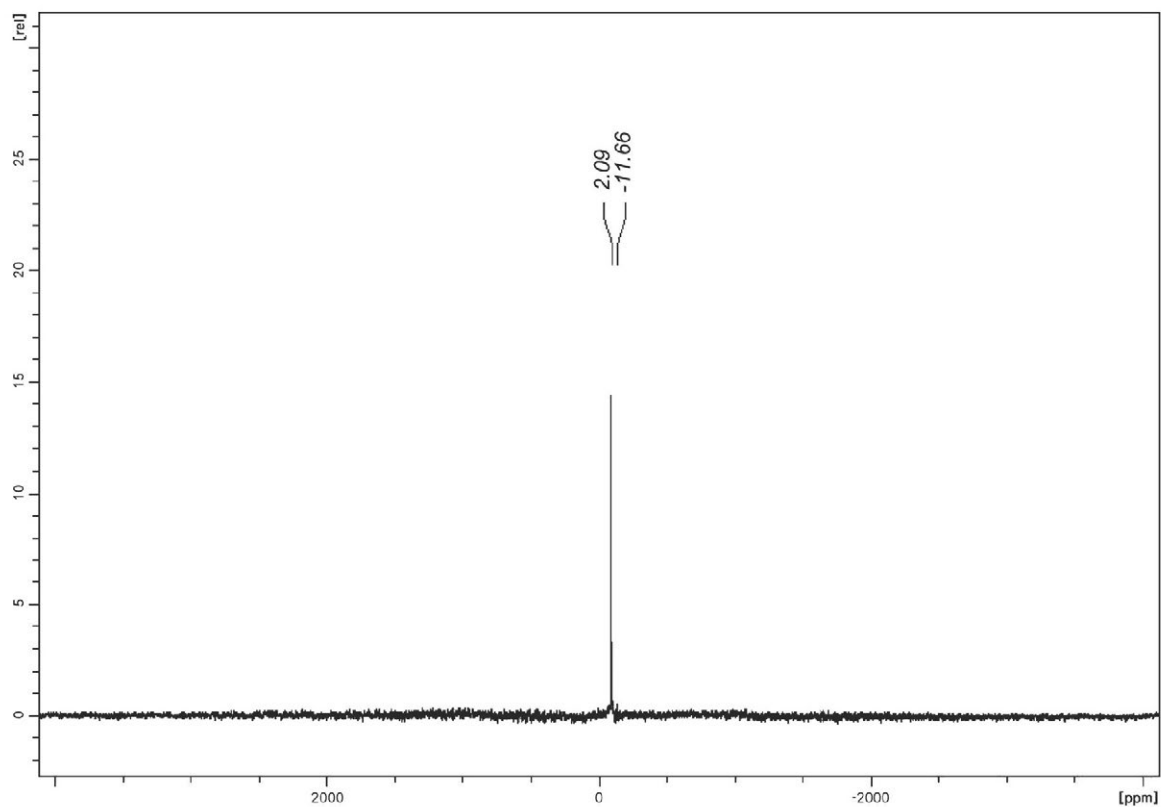


Figure S8. ¹H decoupled ³¹P MAS NMR spectrum (400 MHz, solid state) of AP-nano TiO₂.

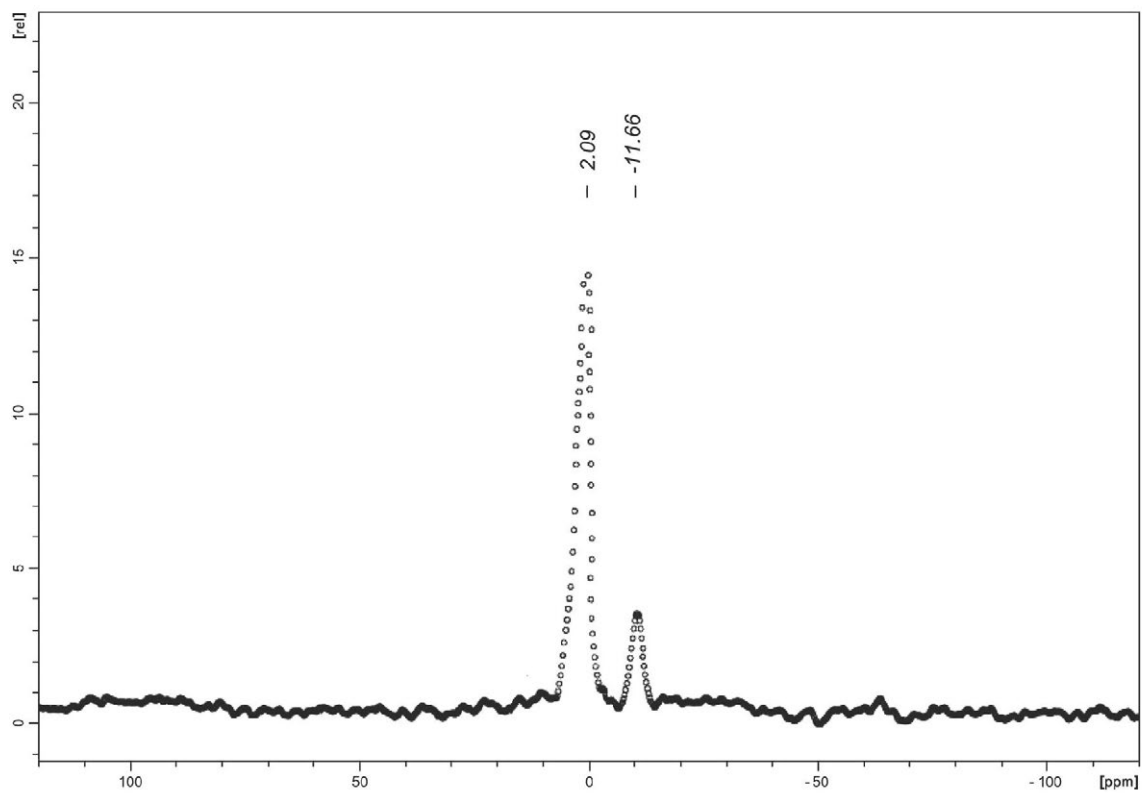


Figure S9. ^1H decoupled ^{31}P MAS NMR spectrum (400 MHz, solid state) of AP-nano TiO_2 (expanded).