Supplementary Information

Premade Nanoparticle Films for the Synthesis of Vertically Aligned Carbon Nanotubes

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Table S1: Current methods of premade catalyst nanoparticles assembly used for CNTs growth

Catalyst composition	Synthesis method	Method of assembly	Average size of catalyst (nm)	References
$AlFe_2O_4$	Colloidal synthesis	Evaporation	9.5 nm	[1]
Fe_3O_4	Wet-chemical synthesis	Drop casting	20 nm	[2]
$Fe_3O4@SiO_2$ core–shell	Thermal decomposition	Langmuir-Blodgett	15 nm	[3]
Fe_3O_4	Wet-chemical synthesis	Self-assembly	4.3 nm	[4]
Fe-Mo	**Thermal decomposition**	**Spin coating**	**3.2 nm**	**[5]**
Fe_3O_4	**Thermal decomposition**	**Self-assembly**	**9.3 nm**	**[This article]**
FeO	**Colloidal solution**	**Dip coating**	**-**	**[6]**
Co	**Thermal decomposition**	**Spin coating**	**8 nm**	**[7]**

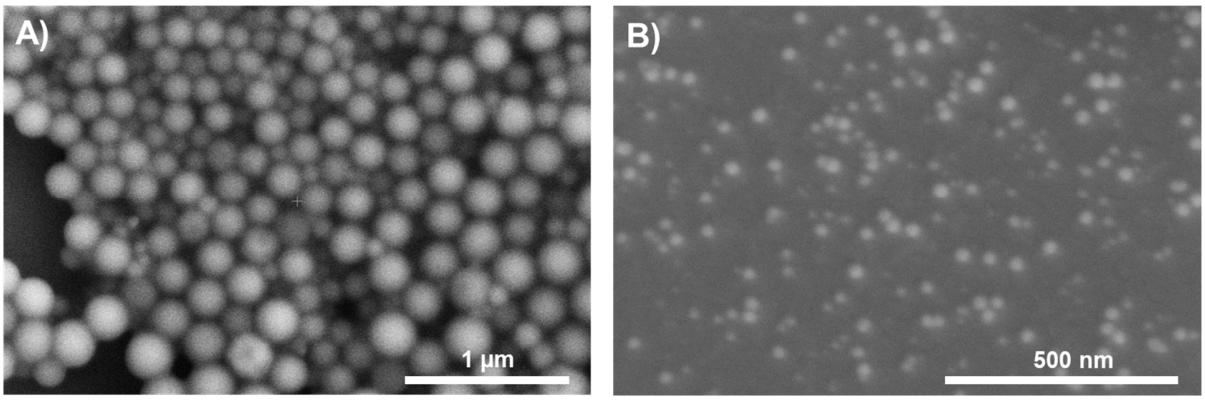

Figure S1: SEM images of spherical shaped aluminum oxide/hydroxide NPs. (A) Large size of aluminum oxide/hydroxide nanoparticles separated by centrifuge technique with 12000 rpm, (B) Small size of nanoparticles remained in decanted solution. A few drops of nanoparticle solution was drop cast onto a silicon wafer and annealed at 400 °C for an hour before characterization.

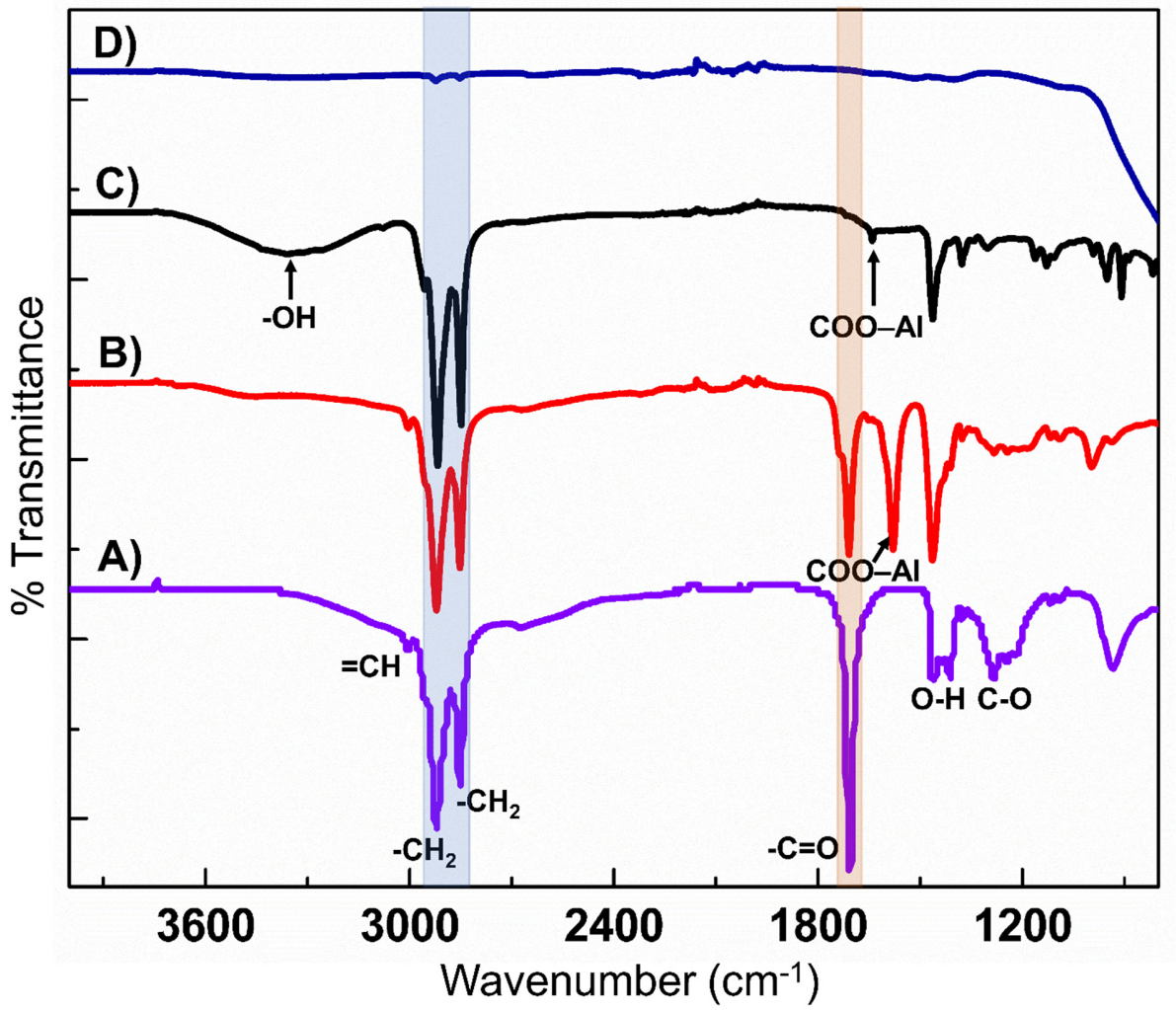

Figure S2: FTIR spectra of (A) pure oleic acid, (B) aluminum oleate, (C) aluminum oxide nanoparticles without annealing, and (D) aluminum oxide nanoparticles annealed at 700 °C

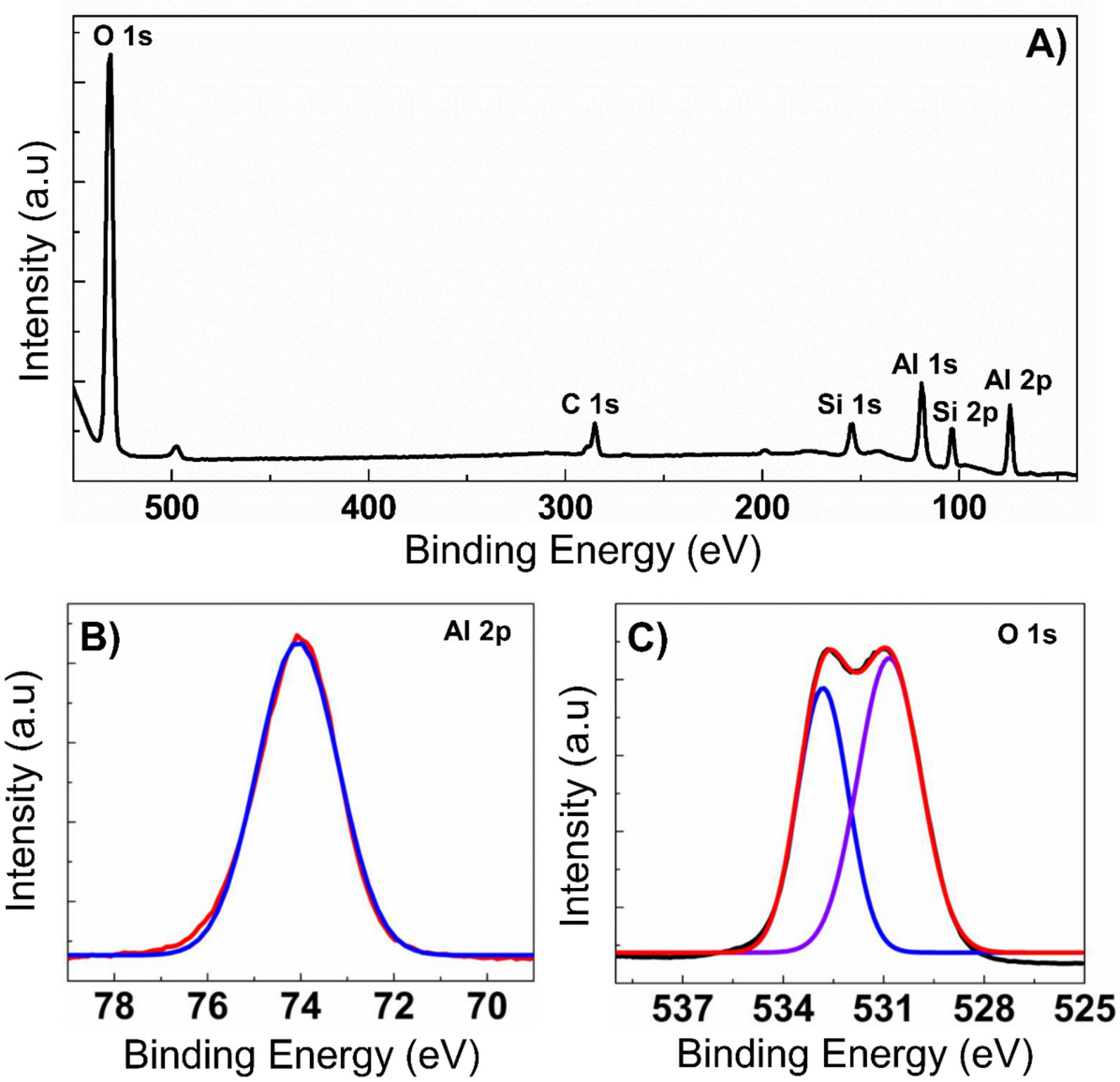

Figure S3: XPS spectra of aluminum oxide nanoparticles after annealing at 700 °C for 2 hours. (A) Survey spectra that represent all the core level peaks, (B) Al 2p, and (C) O 1s

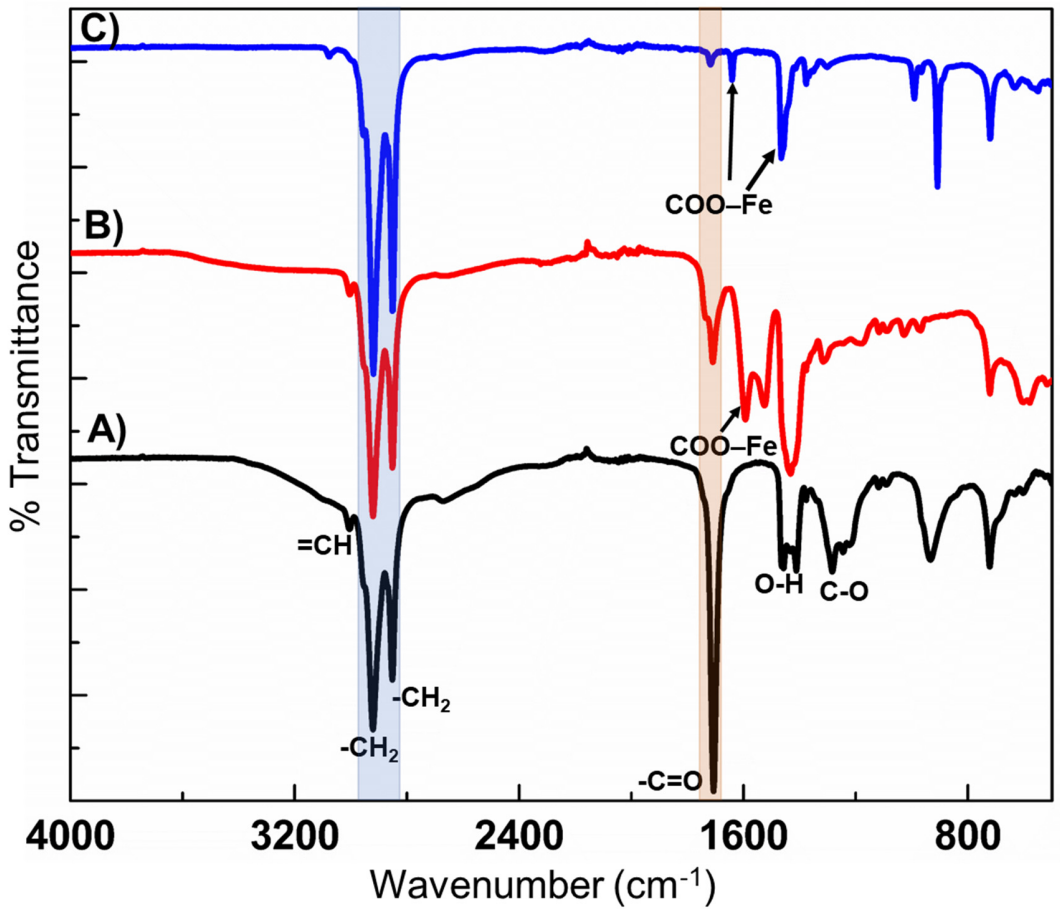

Figure S4: FTIR spectra of (A) pure oleic acid, (B) iron oleate, and (C) oleic acid coated iron oxide nanoparticles

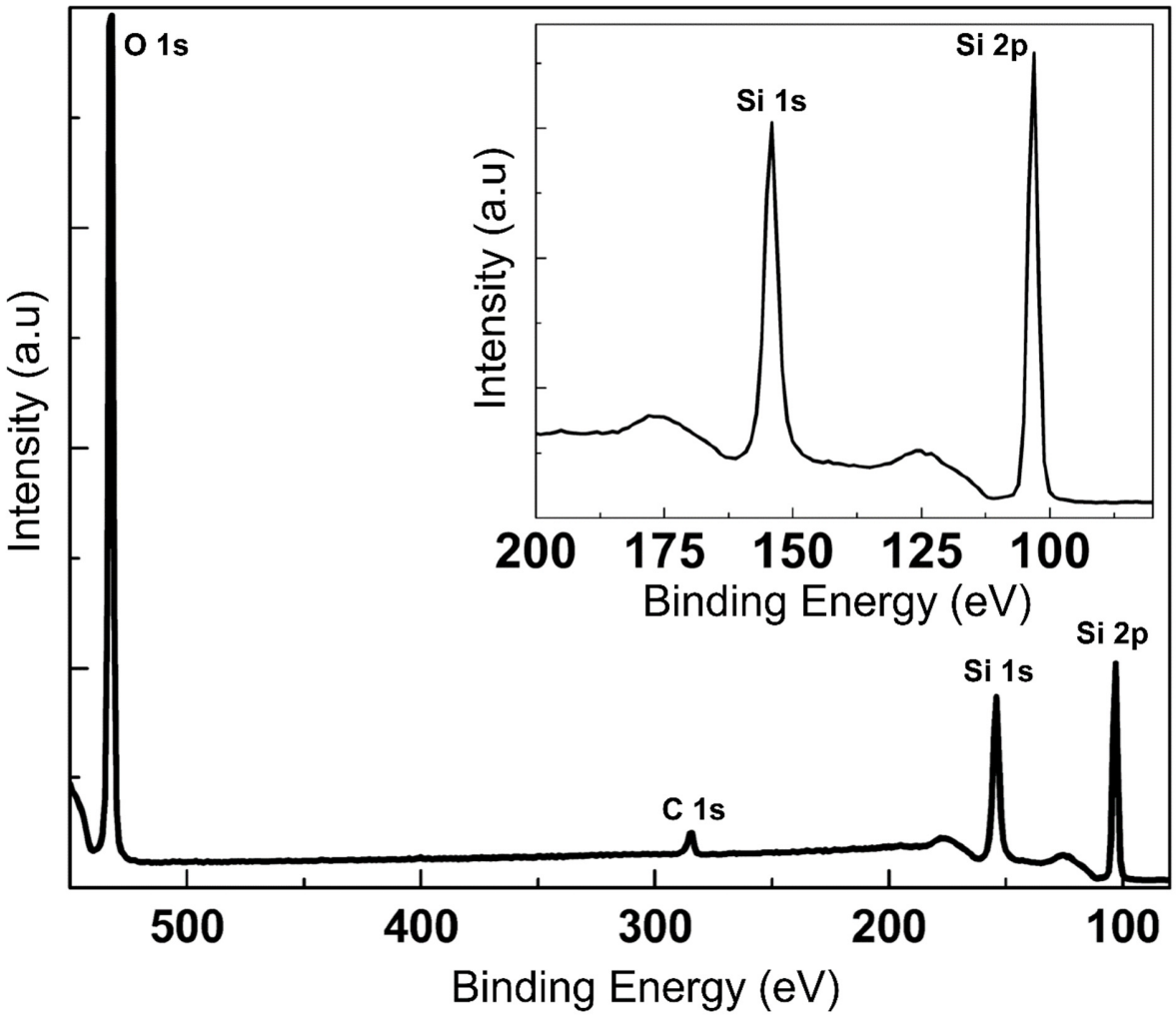

Figure S5: XPS survey spectra of blank silicon oxide substrate that show all the core level peaks

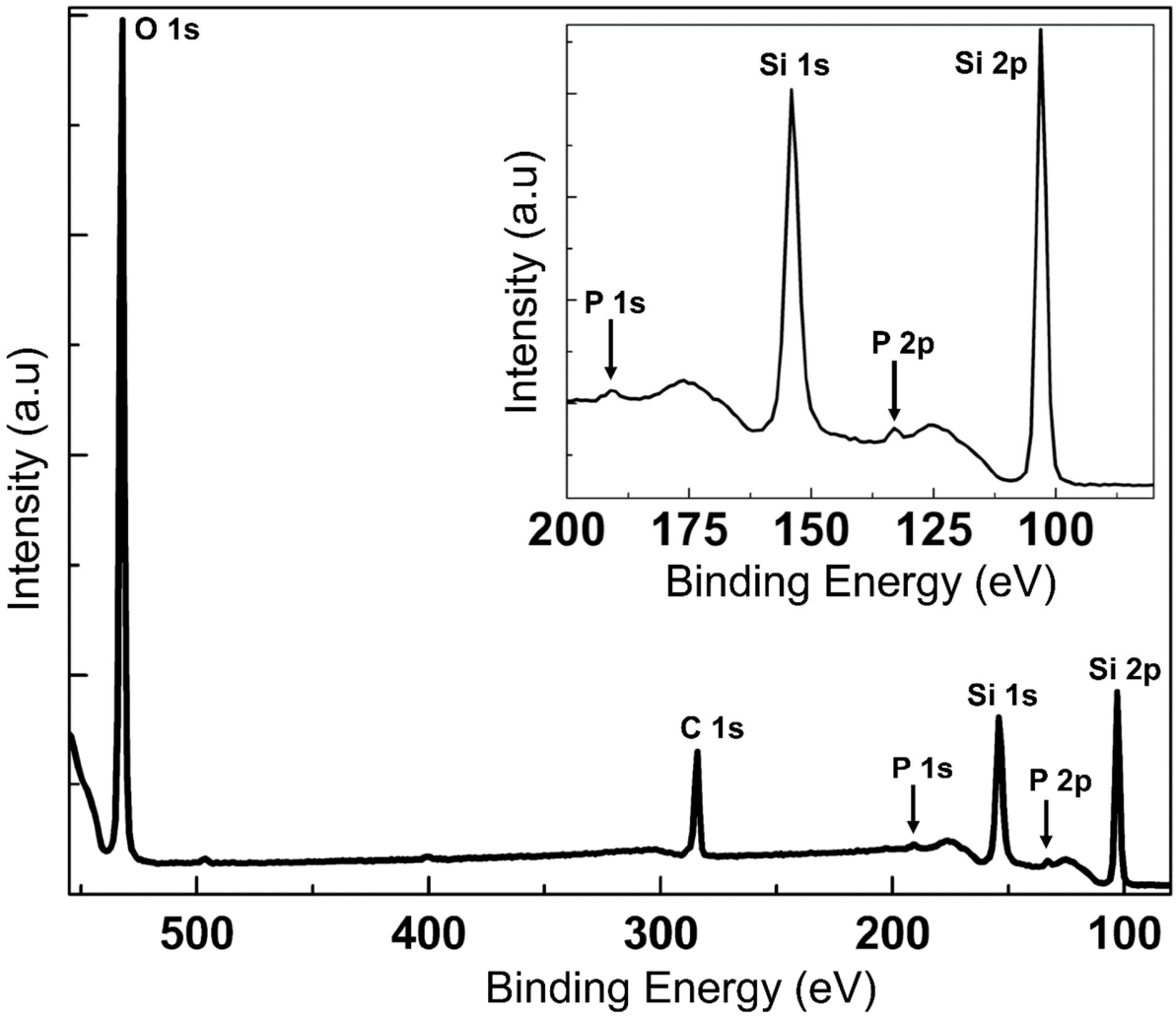

Figure S6: XPS survey spectra of 11-phosphonoundecanoic acid (PNDA) film on silicon substrate showing all core level peaks

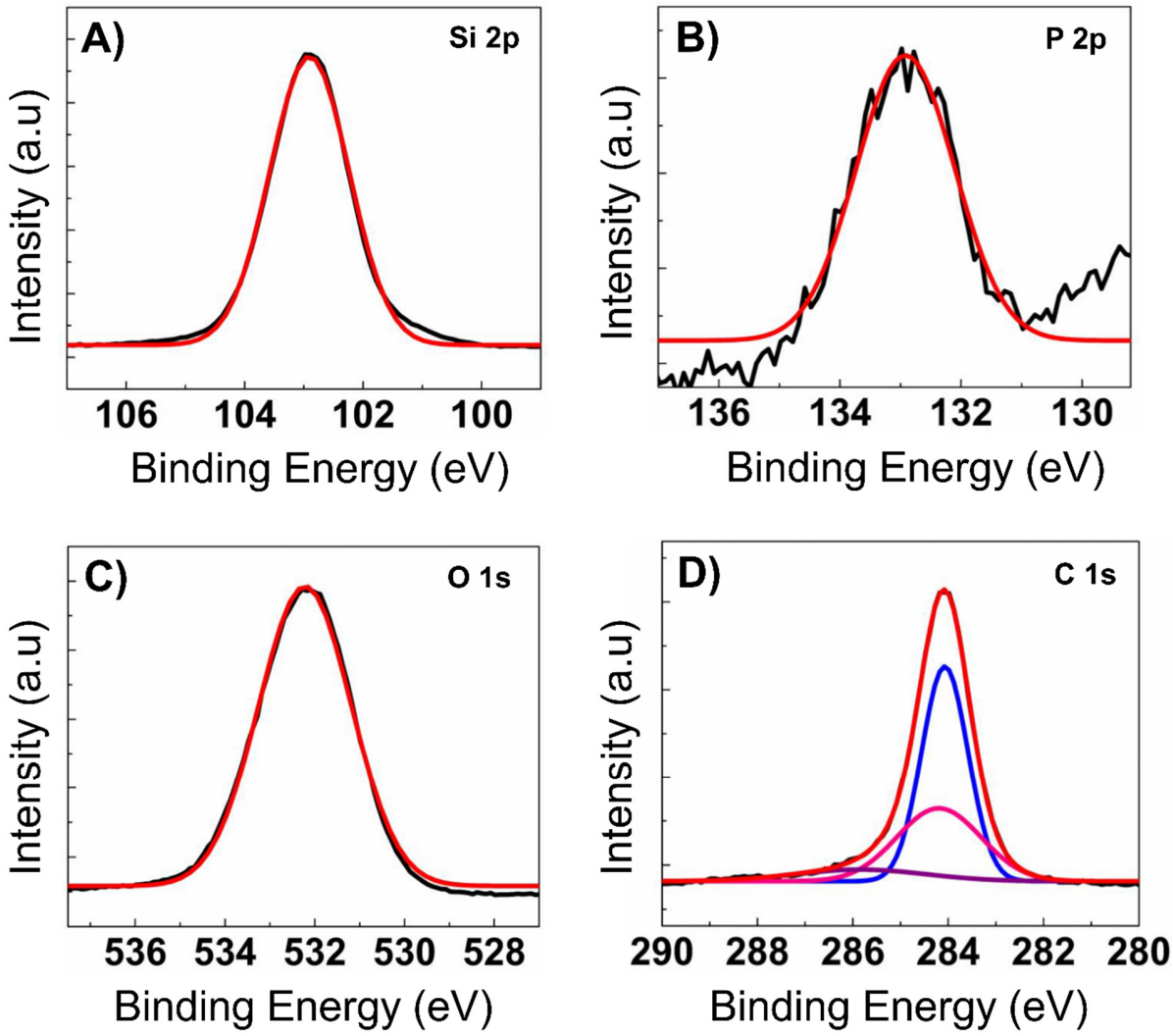

Figure S7: XPS spectra of PNDA attached silicon oxide substrate. (A) core level Si 2p peak, (B) core level P 2p peak, (C) core level O 1s peak, and (D) core level C 1s peak

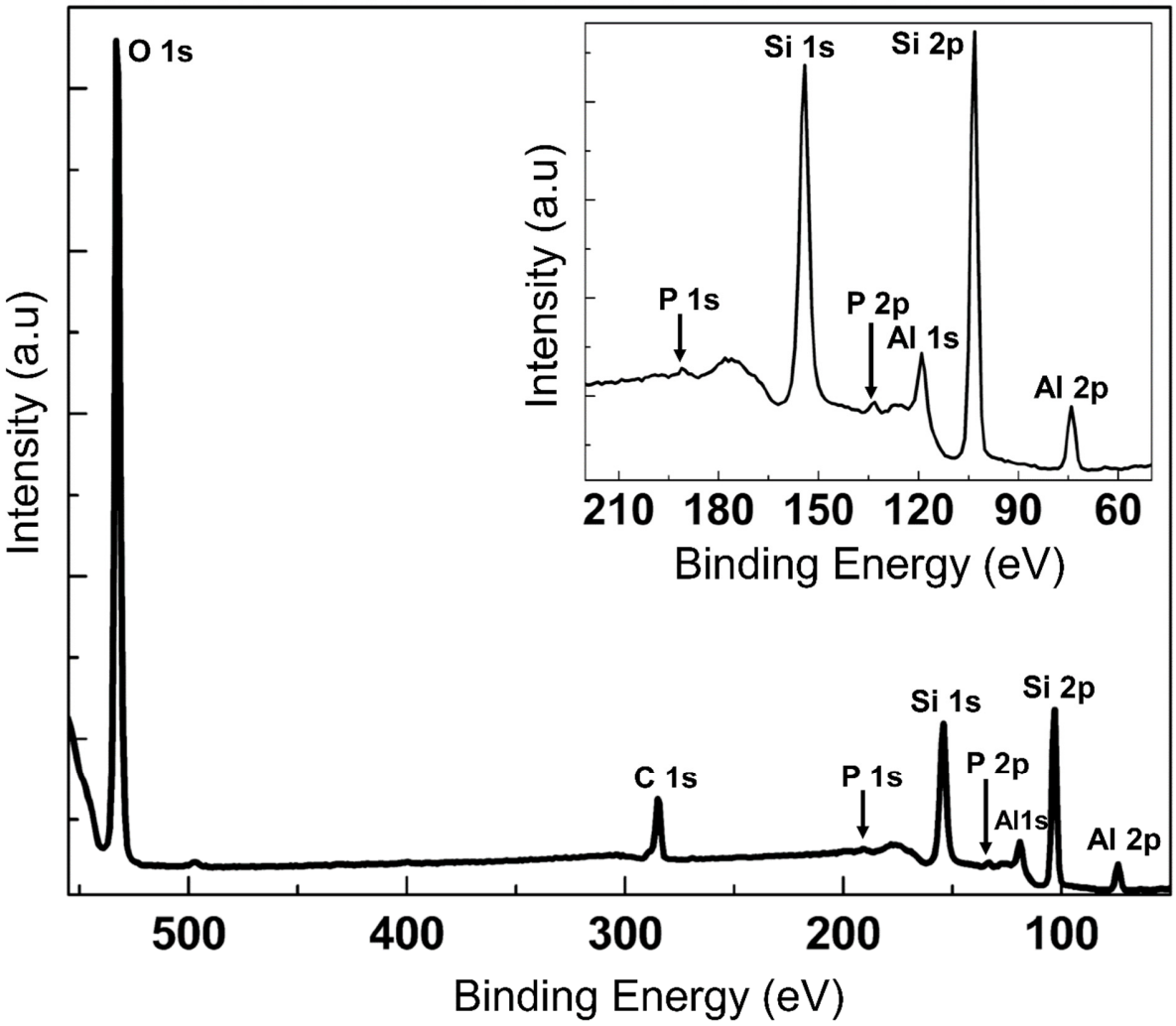

Figure S8: XPS survey spectra of 11-phosphonoundecanoic acid film on alumina monolayer showing all core level peaks

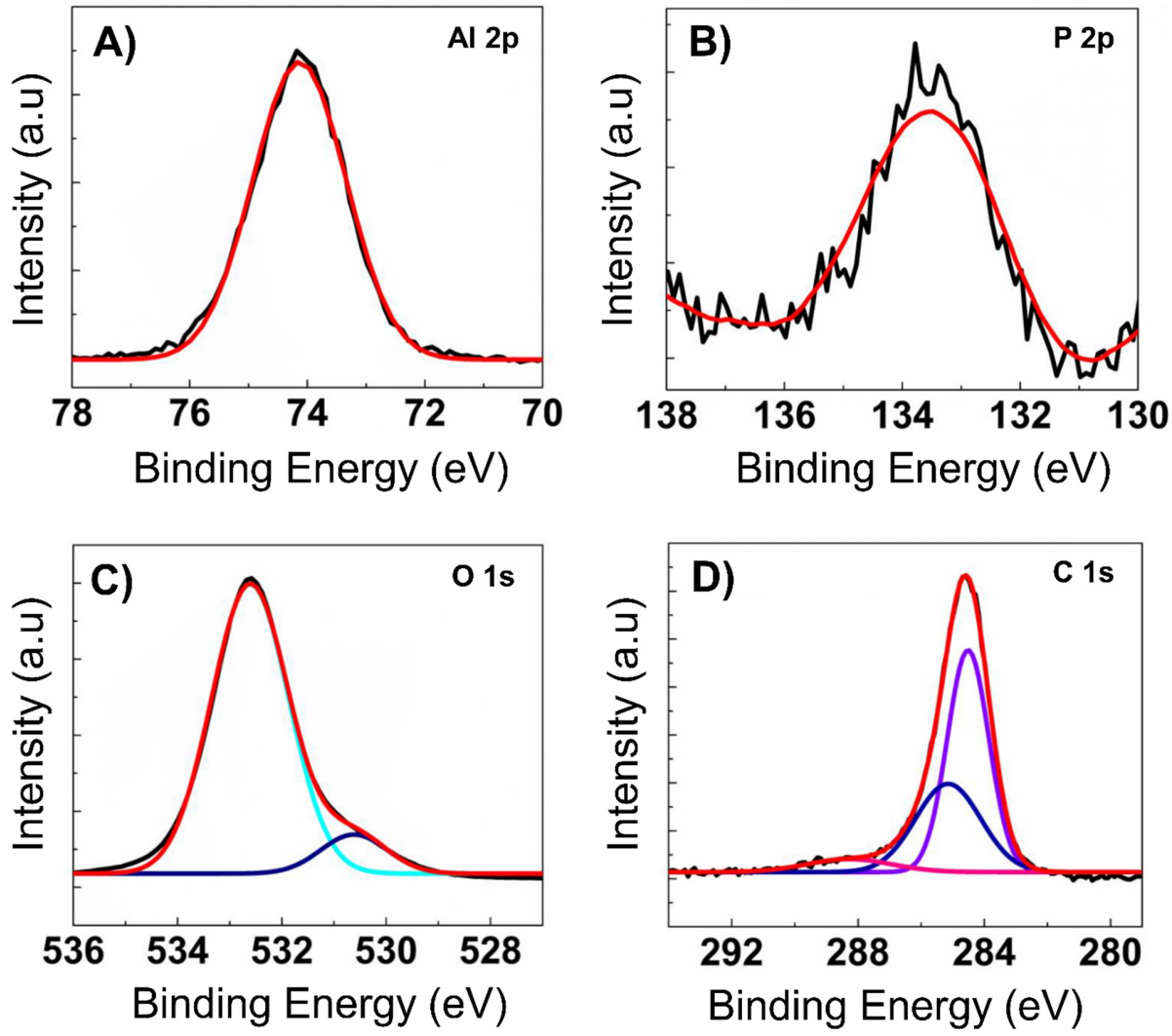

Figure S9: XPS spectra of PNDA attached aluminum oxide substrate. (A) core level Al 2p peak, (B) core level P 2p peak, (C) core level O 1s peak, and (D) core level C 1s peak

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