

Supporting Information

Organosilica nanoparticles with an intrinsic secondary amine: An efficient and reusable adsorbent for dyes

Fang Chen^{1,2}, Eric Zhao¹, Taeho Kim¹, Junxin Wang¹, Ghanim Hableel¹, Philip James Thomas Reardon⁴, Ananthakrishna Soundaram Jeevarathinam¹, Tianyu Wang¹, Santiago Arconada-Alvarez¹, Jonathan C. Knowles⁴, and Jesse V. Jokerst^{1,2,3*}

¹ Department of NanoEngineering

² Materials Science and Engineering Program

³ Department of Radiology

University of California, San Diego, 9500 Gilman Drive, La Jolla, CA 92093, USA

⁴ Division of Biomaterials and Tissue Engineering, UCL Eastman Dental Institute, University College London, London, UK

* Correspondence and requests for materials should be addressed to jjokerst@ucsd.edu.

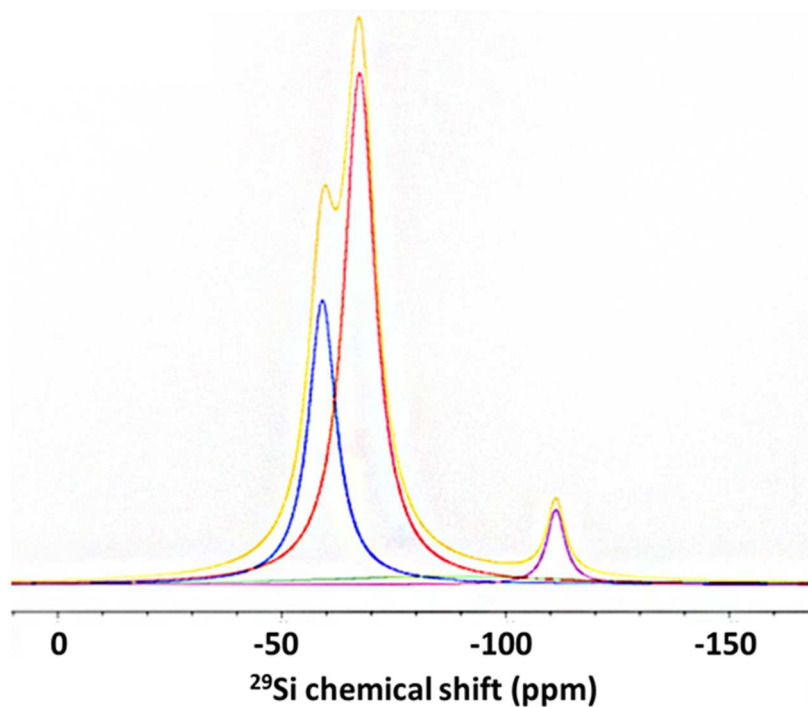


Figure S1. Solid state NMR of the OSNP made of 80% TSPA (yellow). The nanoparticle contains 27.1%, 54.4%, and 18.3% of T^2 (-59 ppm, blue), T^3 (-68 ppm, red), and Q^4 (-112 ppm, purple) species.

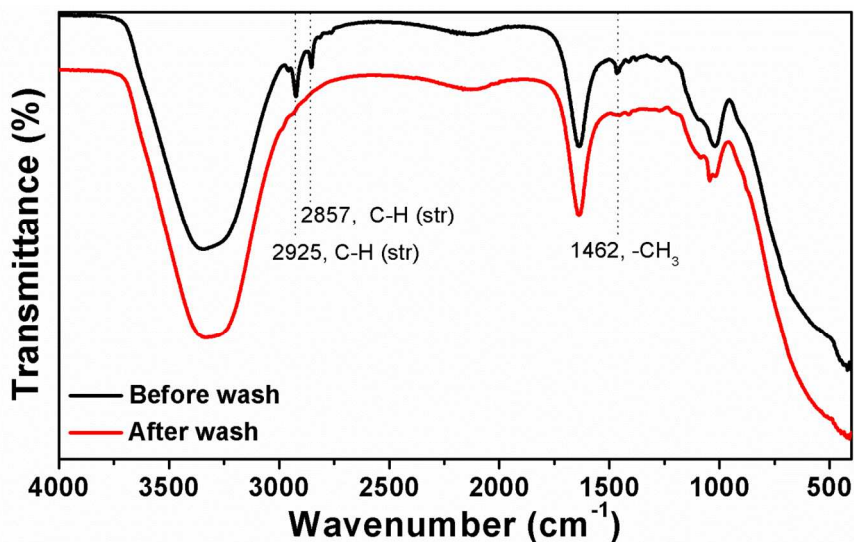


Figure S2. Template removal efficiency by NaCl/methanol solution. The FT-IR absorbance peak at 2925, 2857, and 1462 cm^{-1} disappeared after washing with NaCl/methanol solution. The 2925, 2857, and 1462 cm^{-1} peaks correspond to the asymmetric, symmetric stretching, and bending vibrations of the C-H bond.

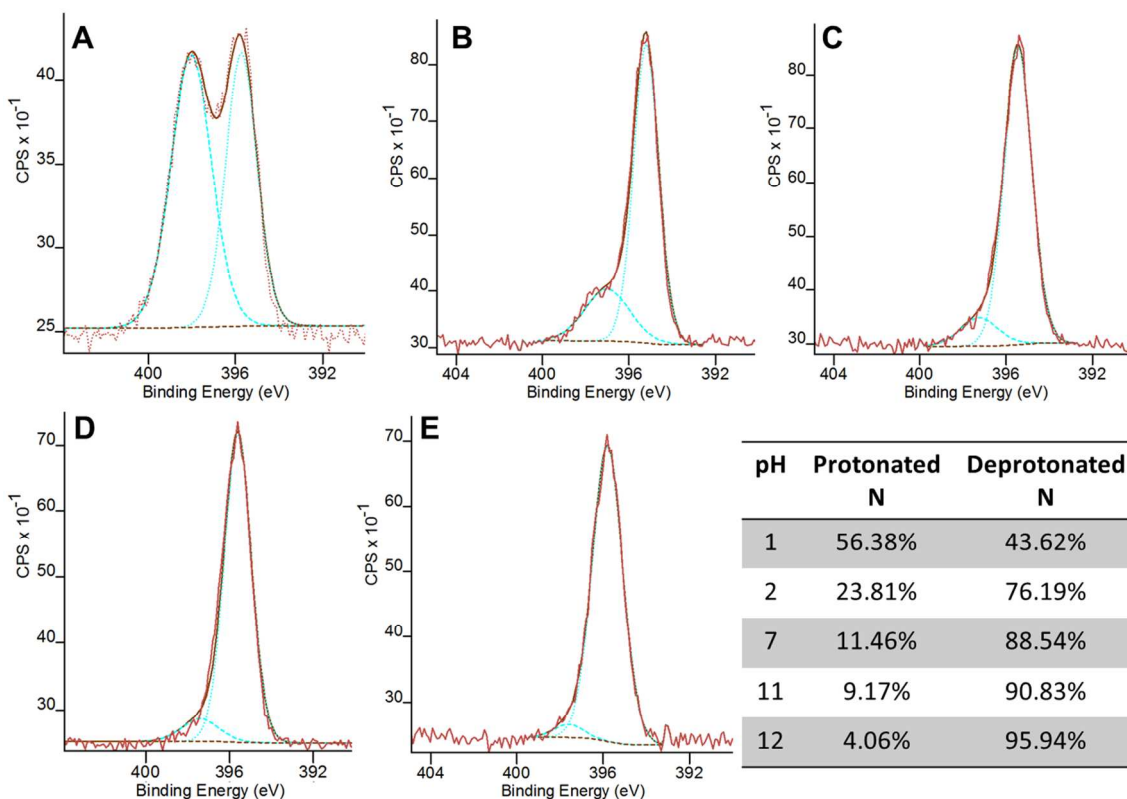


Figure S3. XPS spectra. N1s spectra of the OSNP made of 80% TSPA at (A) pH 1, (B) pH 2, (C) pH 7, (D) pH 11, and (E) pH 12. The binding energy (BE) of deprotonated amine (azure dotted lines) is around 395.5 eV at the five pH. The BE of protonated amine group (azure dashed) shifts to higher BE by 1.8 eV (pH 2, 7, 11, and 12) or 2.3 eV (pH 1), which is consistent with the literatures¹⁻². The table shows the percentage of protonated and deprotonated N1s.

(1) Kallury, K.; Debono, R.; Krull, U.; Thompson, M. Covalent Binding of Amino, Carboxy, and Nitro-Substituted Aminopropyltriethoxysilanes to Oxidized Silicon Surfaces and Their Interaction with Octadecanamine and Octadecanoic Acid Studied by X-Ray Photoelectron Spectroscopy and Ellipsometry. *Journal of Adhesion Science and Technology* 1991, 5, 801-814.

(2) Xu, B.; Jacobs, M.; Kostko, O.; Ahmed, M. Guanidinium Group Is Protonated in a Strongly Basic Arginine Solution. *Chemphyschem* 2017, Accepted Author Manuscript. doi:10.1002/cphc.201700197.