Bactericidal efficacy of nitric oxide-releasing silica nanoparticles

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Supporting Information

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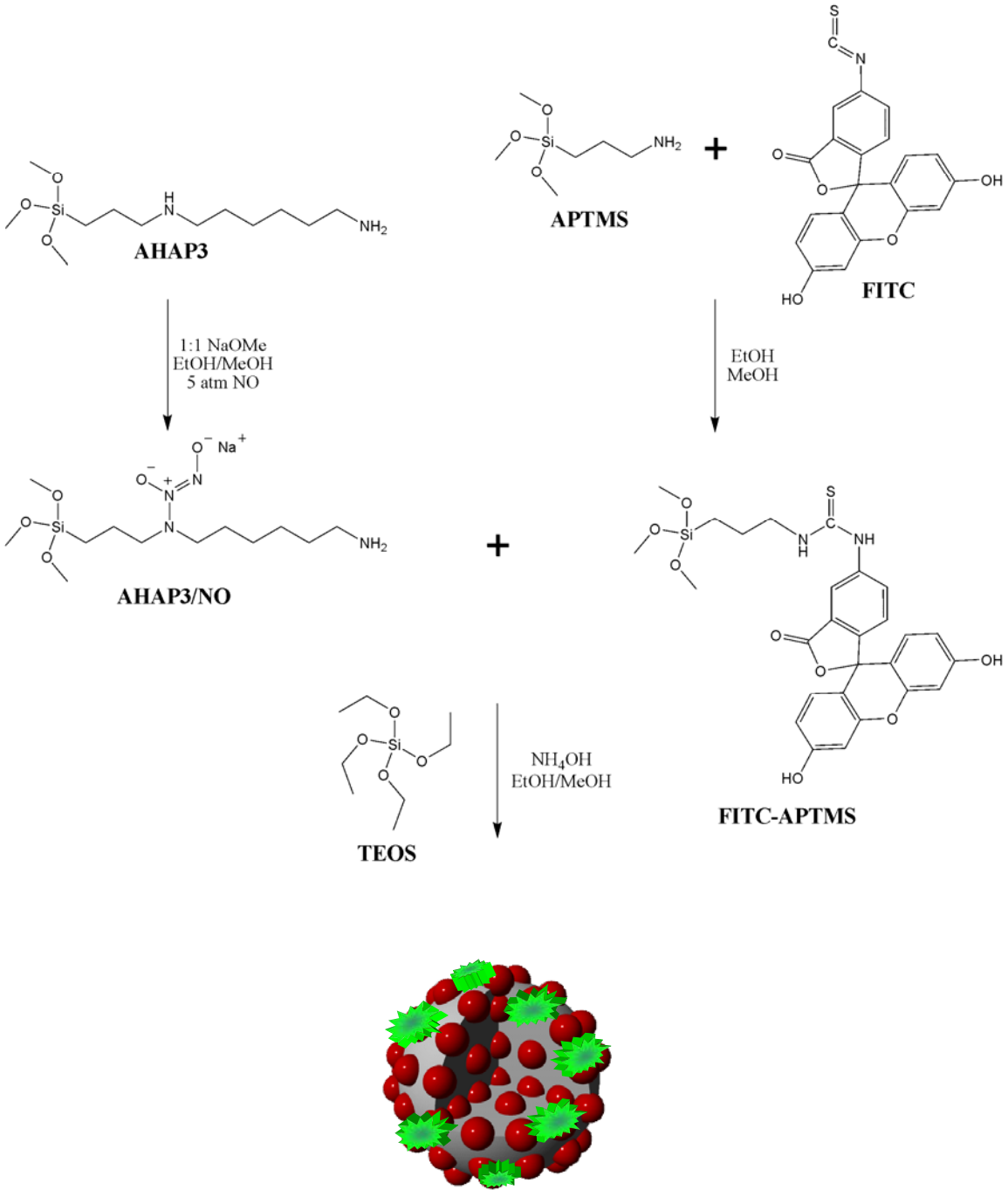

Scheme S1. Synthesis of FITC-modified NO-releasing 45 mol% AHAP3 silica nanoparticles (balance TEOS). Abbreviations: AHAP3 = *N*-(6-aminohexyl)aminopropyltrimethoxysilane; APTMS = 3-aminopropyltrimethoxysilane; FITC = fluorescein isothiocyanate; TEOS = tetraethoxysilane.

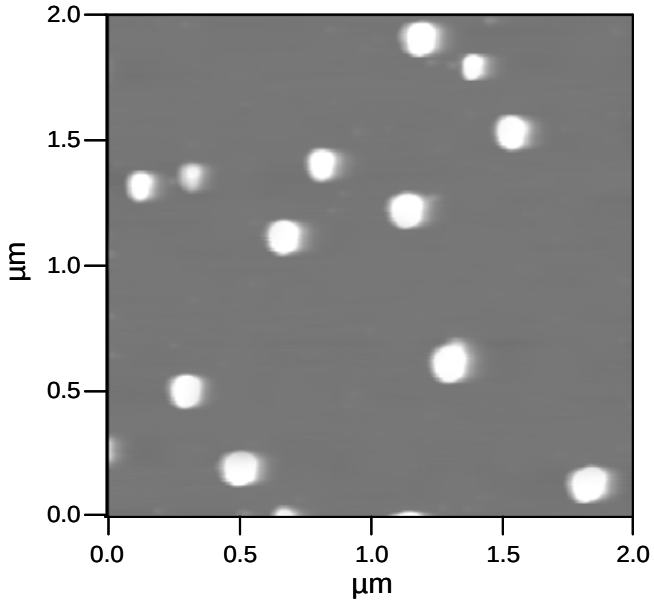

Figure S2. AC mode AFM height image of 45 mol% AHAP3 silica nanoparticles (balance TEOS) on a mica surface.

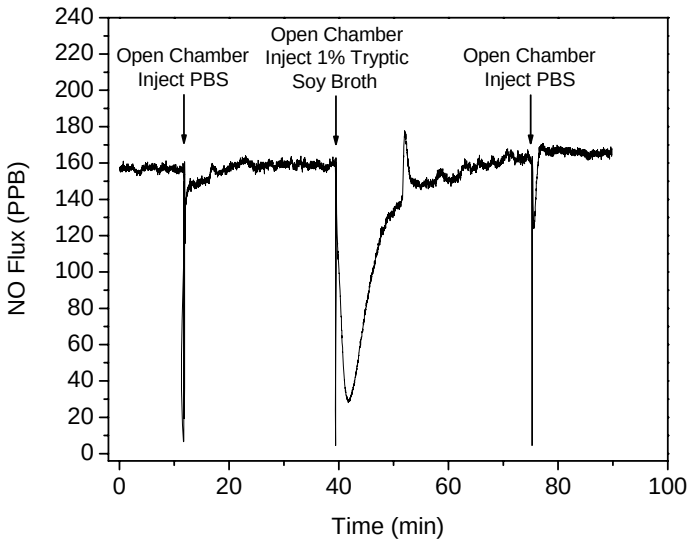

Figure S3. Real-time NO release of the small molecule diazeniumdiolate NO-donor DETA/NO before, during, and after injection of 1% tryptic soy broth (TSB), as measured using a chemiluminescent nitric oxide analyzer.

To determine the NO-scavenging properties of tryptic soy broth (TSB), NO release from the small molecule NO-donor DETA/NO was measured before, during, and after injection of 1% TSB. DETA/NO was chosen as the model system because its long half-life (57 h) leads to a stable baseline of NO release as observed with a Sievers 280 chemiluminescent NO analyzer (Boulder, CO). Once a stable NO-release baseline had been established, 300 μL of phosphate buffered saline (PBS) was injected into the solution vessel as a control. After a stable baseline was reestablished, 300 μL of TSB was injected, resulting in a 1% TSB solution. Following a return to baseline, 300 μL of PBS was again injected to ensure consistency before and after the TSB injection. As observed in Figure S2, the NO signal dropped significantly then rapidly returned to the baseline release level of DETA/NO during the injection of control solutions. The spikes are due to the period during which NO was unable to reach the detector while the solution vessel was open to air. In contrast, when TSB was injected into the vessel, a prolonged period of below-baseline response was observed, due to the scavenging of NO by the protein digests that comprise TSB. Notably, the maximum concentration of TSB tested was 1% (due to uncontrollable "frothing" above 1%). The NO-scavenging properties of 100% TSB (which was used in the antibacterial assays) are expected to be significantly greater.

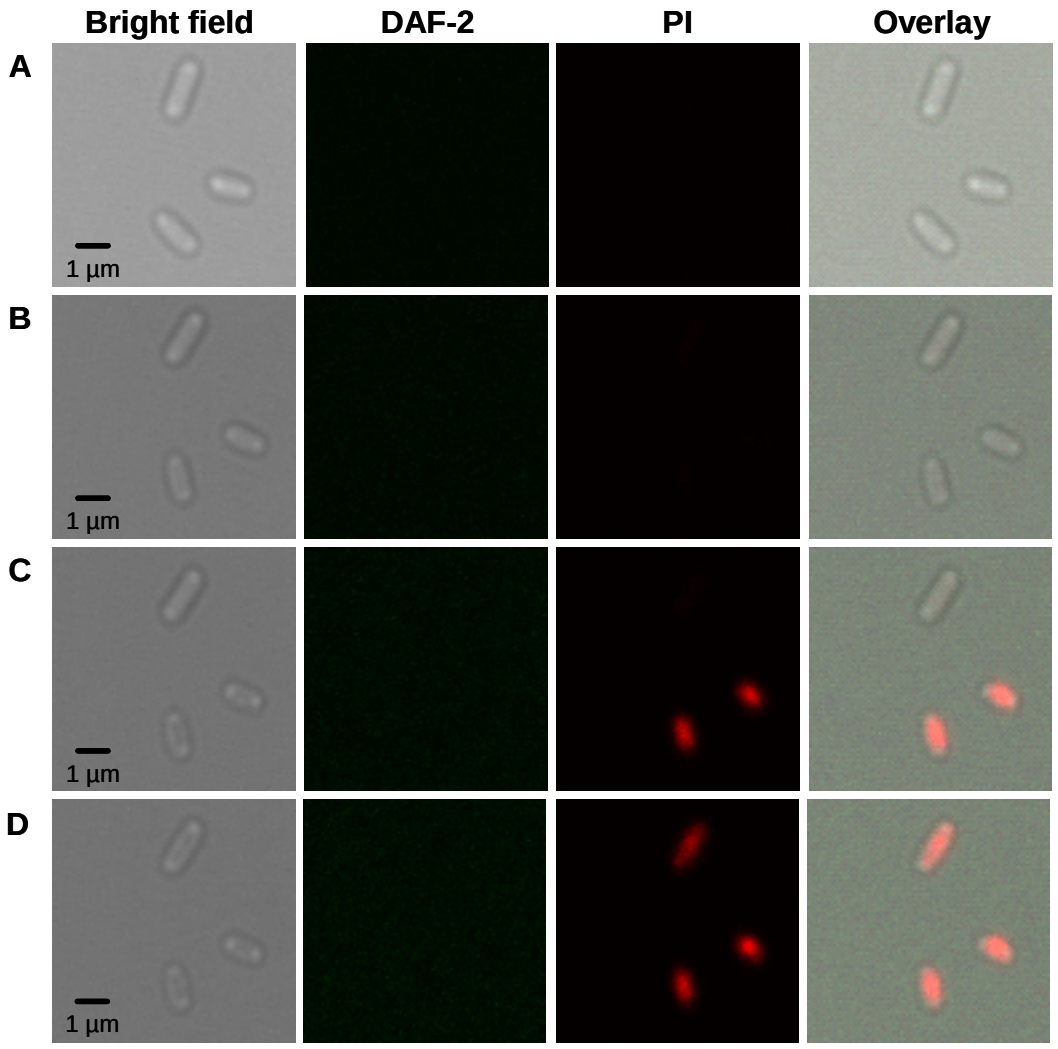

Figure S5. Bright field and fluorescence images of *P. aeruginosa* cells treated with 5 mg·mL^{-1} PROLI/NO. Propidium iodide (PI) fluorescence indicates cell death. Images were acquired (A) 0 min, (B) 10.5 min, (C) 21min, and (D) 31 min after addition of 5 mg·mL^{-1} PROLI/NO.