

Supplementary Materials

Hydrophobic Forces Are Relevant to Bacteria-Nanoparticle Interactions: *Pseudomonas putida* Capture Efficiency by Using Arginine, Cysteine or Oxalate Wrapped Magnetic Nanoparticles

Federico Figueredo ¹, Albert Saavedra ¹, Eduardo Cortón ^{1,*} and Virginia E. Diz ^{2,*}

¹ Laboratory of Biosensors and Bioanalysis (LABB), Biochemistry Department, IQUIBICEN-CONICET, FCEN, UBA, Buenos Aires 1428, Argentina; figueredofederico@yahoo.com (F.F.); albert.saavedra.olaya@gmail.com (A.S.)

² Departamento de Química Inorgánica, Analítica y Química Física, FCEN, UBA, Buenos Aires 1428, Argentina

* Correspondence: eduardo@qb.fcen.uba.ar (E.C.); dizvirginia@gmail.com (V.E.D.);
Tel.: +54-11-4576-3342 (E.C.)

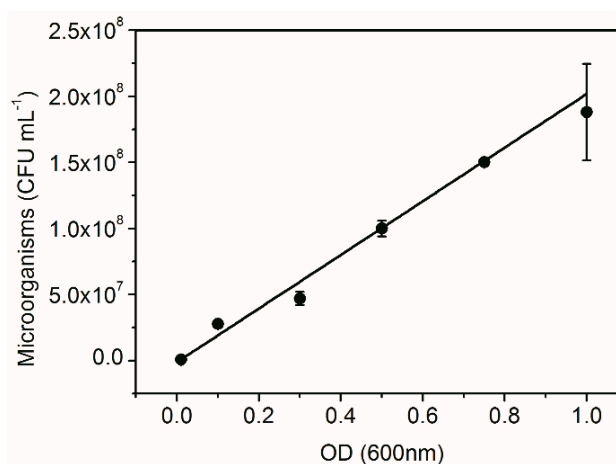


Figure S1. *P. putida* cells concentration and optical density relationship, used to calculate the amount of cells used in the bacteria capture assays.

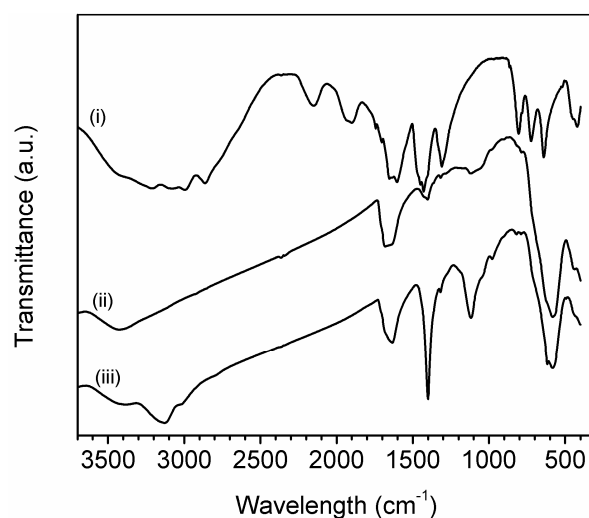


Figure S2. FT-IR spectra for (i) ammonium oxalate and the synthesis product obtained with molar ratio of $\text{Fe}^{3+}:\text{Fe}^{2+}:\text{C}_2\text{O}_4^{2-}$ equal to (ii) 2:1:0.1 and (iii) 2:1:1.

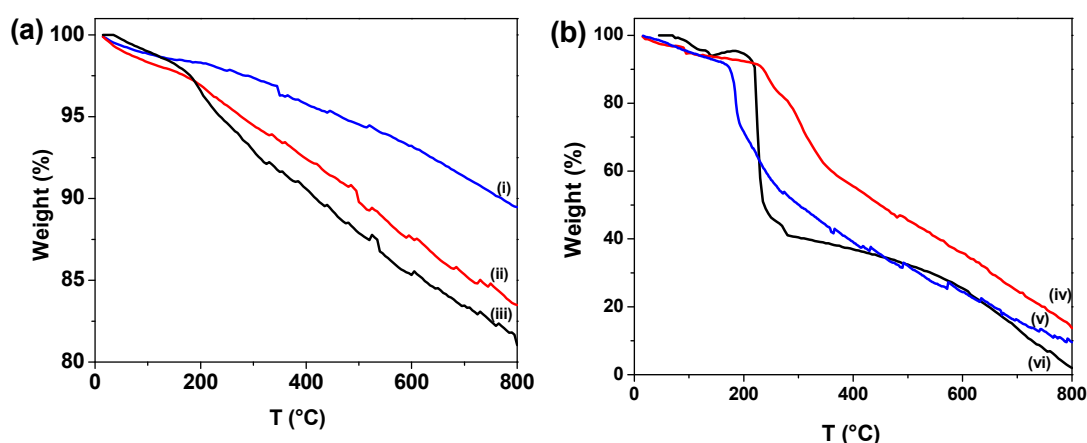


Figure S3. TGA curves of NPs and their organic outside layer. a: (i) Fe₃O₄@Cys, (ii) Fe₃O₄@Arg and (iii) Fe₃O₄@Oxa, and b: (iv) L-Arg, (v) L-Cys, (vi) oxalate.

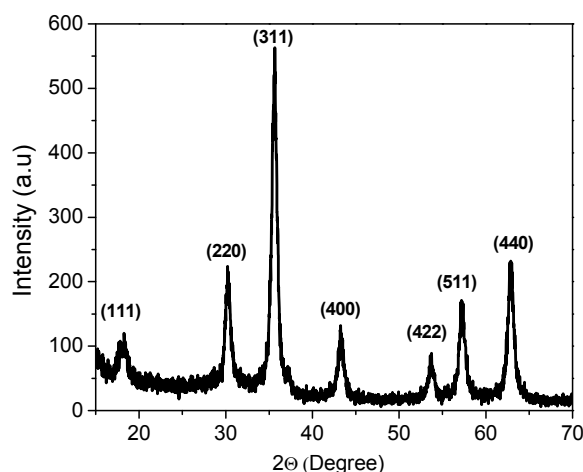


Figure S4. X-ray diffraction patterns of NPs functionalized with arginine (Fe₃O₄@Arg). Similar results were obtained with oxalate and cysteine wrapped NPs.

Contact angle experiments

Methodology

To study the degree of hydrophobicity of the synthesized NPs, first 0.5 mg of each NP were weighted and suspended in 300 µL of exanol, by using a vortex. Then, 100 µL of each obtained suspension was speeded by the froth technique, over a glass slide, obtaining a homogenous film. After that the film was dried under an IR lamp, and later (after cooling) a 50 µL drop of water was carefully disposed over the film, and the contact angles were registered.

Results

The degree of hydrophobicity obtained to the NPs, determined by the measurement of the contact angles show the following tendency: Fe₃O₄@Arg > Fe₃O₄@Cys > Fe₃O₄@Oxa. The measured angles were 39.5°, 32.0° and 26.5°, respectively (Fig. S5).

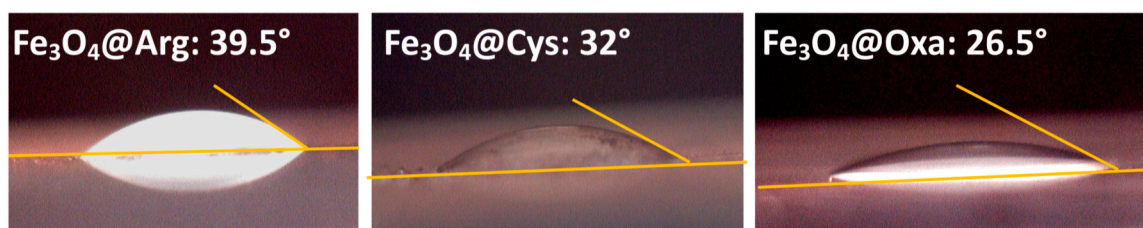


Figure S5. Contact angle experiment. NPs were disposed over a glass slide by means of the frotis technique, and a drop of water was disposed over the film.