Supplementary Information

Anisotropic biodegradable lipid coated particles for spatially dynamic surface protein presentation

Randall A. Meyer,[A,B,C,†] *Mohit P. Mathew,*[A,B,†] *Elana Ben-Akiva,*[A,B] *Joel C. Sunshine,*[A,B] *Ron B Shmueli,*[A,B] *Qiuyin Ren,*[A,B] *Kevin J. Yarema,*[A,B] *Jordan J. Green*[A,B,C,D,E,F,G,H,*]

[A] Department of Biomedical Engineering, [B] Translational Tissue Engineering Center, [C] Institute for Nanobiotechnology, [D] Department of Materials Science and Engineering, [E] Department of Ophthalmology, [F] Department of Oncology, [G] Department of Neuroscience, [H] Department of Chemical and Biomolecular Engineering, Johns Hopkins University School of Medicine, Baltimore, MD, 21231, USA.

[†] These authors contributed equally to this work.
* Corresponding author:

Dr. Jordan J. Green
400 N Broadway
Smith 5017
Baltimore, MD 21231
T: 1-410-614-9113
F: 1-443-287-6298
green@jhu.edu

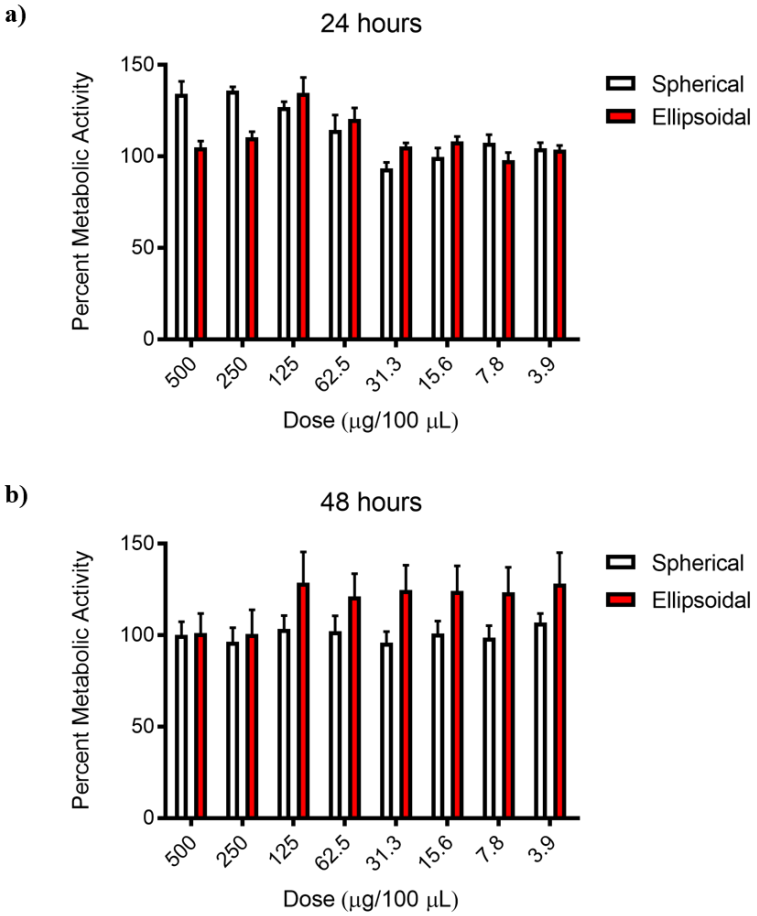

Figure S1: Viability of macrophages during cell uptake experiments is not statistically reduced by the presence of lipid coated particles. Macrophages were incubated for (a) 24 hrs. or (b) 48 hrs. with the indicated concentration of particles and viability was established by cell titer assay and normalization to the untreated control. Error bars represent standard deviation of four replicates.

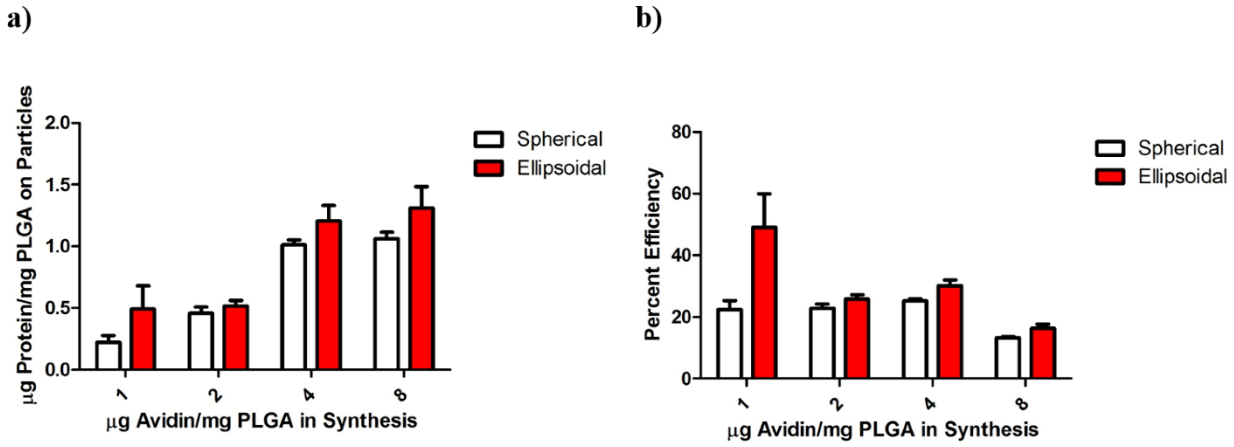

Figure S2: (a) Total protein conjugation amount of fluorescent avidin to spherical and ellipsoidal supported lipid bilayers. (b) Efficiency of conjugation for various ratios of avidin to mass of particles in synthesis. A two way ANOVA was performed to analyze statistical differences in the efficiency data set: $p = 0.0303$ for shape/dose interaction, $p = 0.0057$ for shape impact on results, and $p = 0.0013$ for dose impact on results. There was no significant difference between shapes at any dose tested as evaluated by Bonferroni's post test ($p>0.05$) except for at 1 µg avidin/mg PLGA ($p<0.01$).

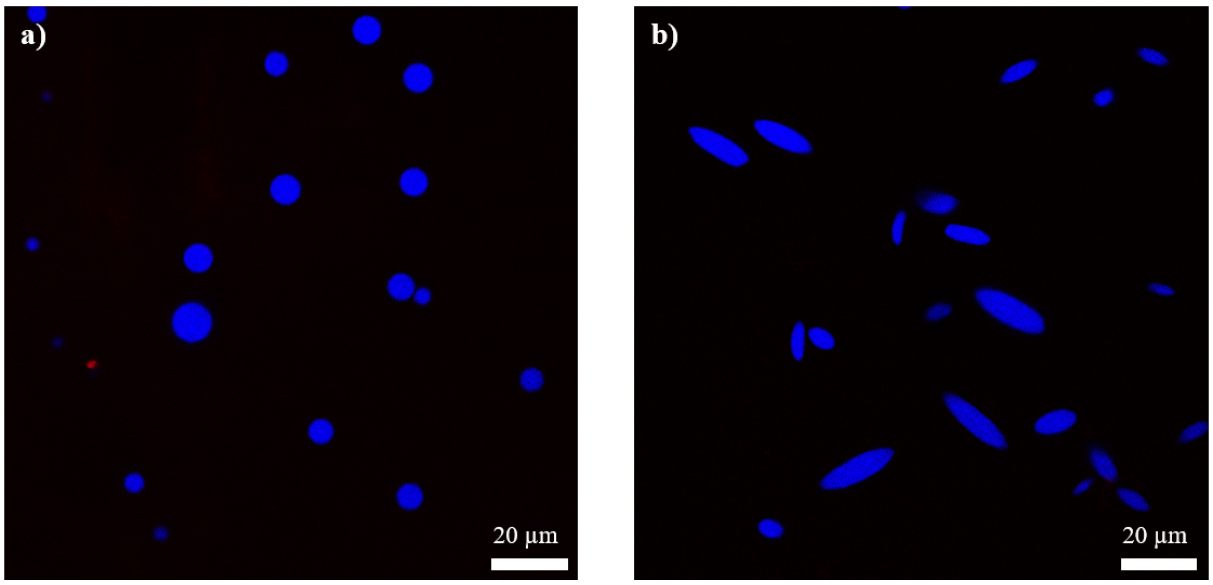

Figure S3: Biotinylated molecules do not adhere to the lipid coated particles without avidin intermediate protein. (a) Spherical and (b) ellipsoidal lipid coated particles were prepared in the absence of avidin thiol and then incubated with Cy5-biotin. Particles (blue) and Cy5-biotin (red) were then imaged using confocal microscopy.

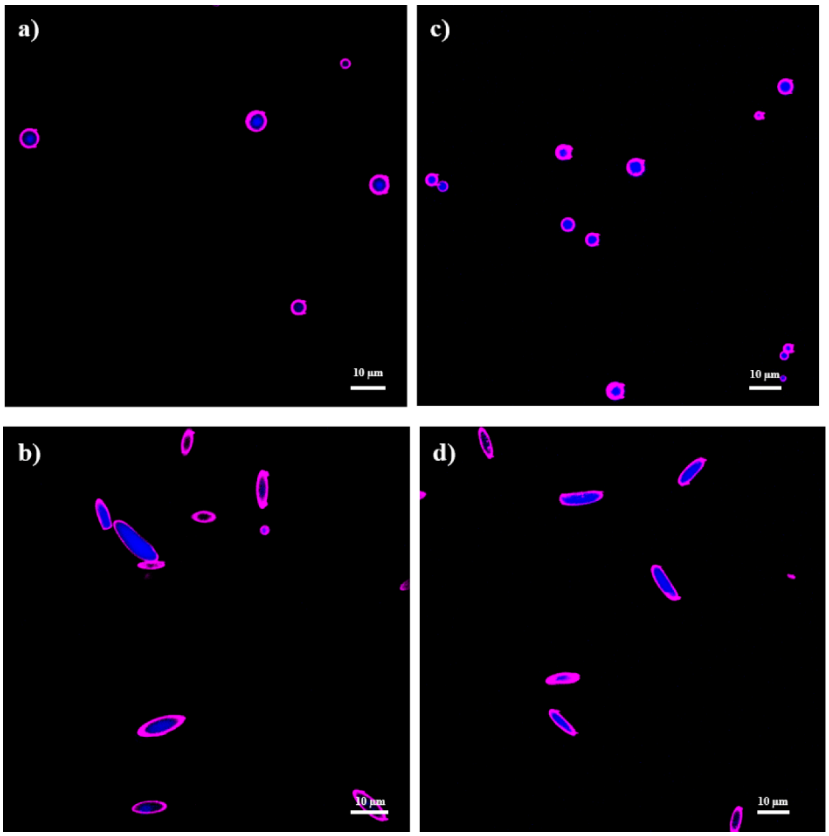

Figure S4: (a)/(c) Spherical and (b)/(d) ellipsoidal protein conjugated lipid bilayers are stable (a)/(b) before and (c)/(d) after lyophilization.

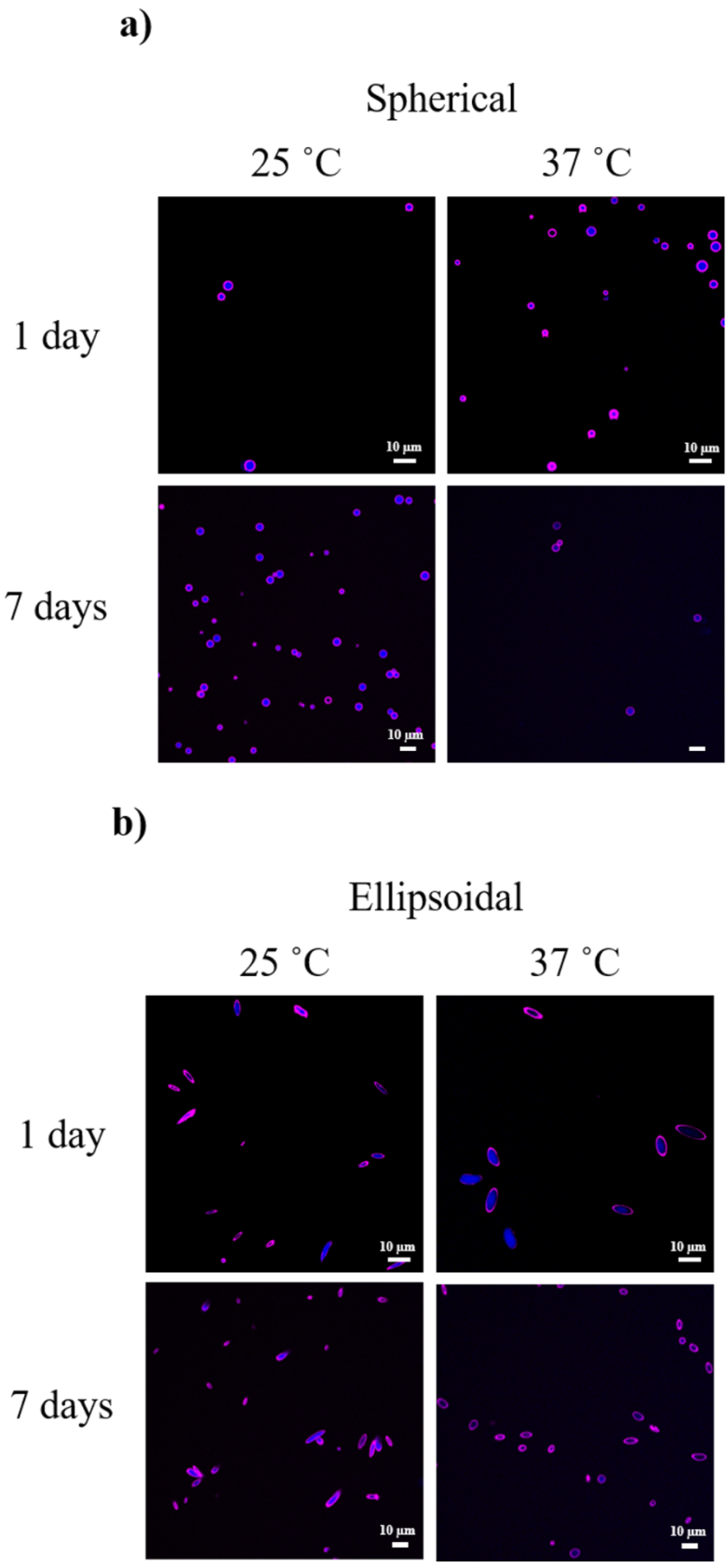

Figure S5: (a) Spherical and (b) ellipsoidal SLBs with Cy5 biotin conjugated to the surface were incubated at the indicated temperature for the indicated amount of time to assess stability of lipid coats. Confocal image analysis demonstrates stable presentation of surface ligands over all time points and conditions tested.