Supplementary methods:

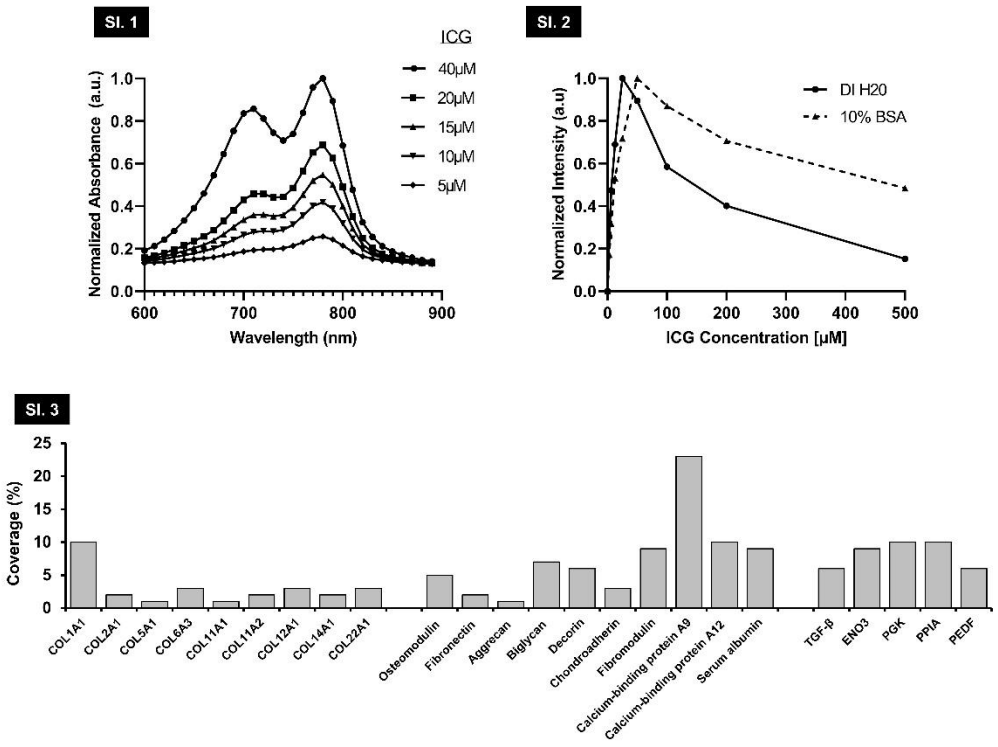
Mass spectrometry (MS): The MS was performed by the MS Center at MCW and followed the protocol introduced by Moriya Slavin, etc., [1] to identify the protein components in the ICG/BPs. The ICG-BP samples were resuspended in 20 µL of 8 M urea with 10 mM DL-Dithiothreitol (DTT) by sonication. Iodoacetamide was then added to a final concentration of 25 mM and the alkylation reaction was proceeded for 30 min. The samples were further digested with trypsin at a 1:100 protease-to-protein ratio overnight at 37 °C under agitation. Following digestion, the samples were cleaned using the PreOmics Phoenix kit according to the manufacturer's directions. Samples were then dissolved in 2% acetonitrile 0.1% formic acid and analyzed on a Thermo Scientific Orbitrap Fusion Lumos MS. MS data was analyzed using the Proteome Discoverer 2.4 (Thermo Scientific, Waltham, MA) platform and protein identifications were filtered to include only those proteins identified by two or more unique peptides identified and ranked as high confidence.

Thermogravimetric analysis (TGA): The thermal behaviors of the ICG/BPs were characterized by TGA, including water loss, phase changes, and decomposition. Weighed amounts of lyophilized ICG/BPs were placed into a pan and inserted into a Thermal Gravimetric Analyzer SDT650 (TGA, TA Instruments, DE). A ramp up temperature of 10˚C per minute was selected, starting at room temperature, and recording to 800˚C. The starting and ending weight of the sample was recorded and stored, and all relevant data exported into excel for analysis.

Reference:

1. Li, Z. and C. Kleinstreuer, *Analysis of biomechanical factors affecting stent-graft migration in an abdominal aortic aneurysm model.* J Biomech, 2006. **39**(12): p. 2264-73.

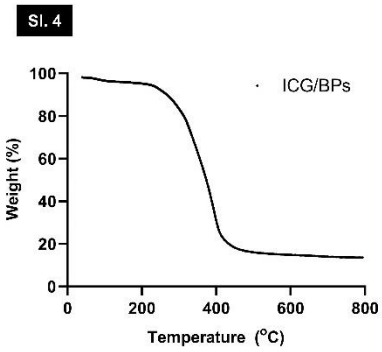
Supplementary figure caption:

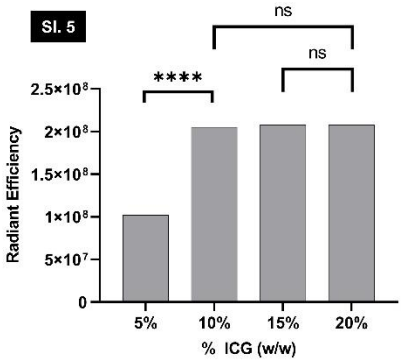


Supplementary Figure 1: Standard calibration curve for the absorbance of ICG using 40, 20, 15, 10, and 5µM concentrations in deionized water.

Supplementary Figure 2: Standard calibration curve for the Fluorescence of ICG using free ICG dye resuspended in both deionized water and 10% Bovine Serum Albumin (BSA) solution for better physiologic comparison. Each solution was measured at 500, 200, 100, 50, 25, 12.5, 6.25, 3.125, and 0 µM.

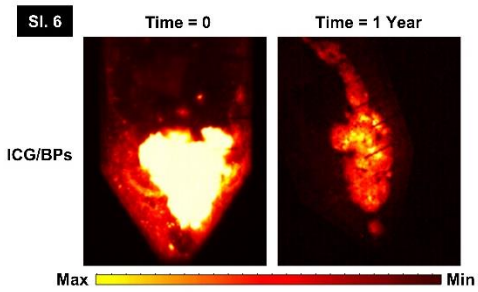
Supplementary Figure 3: Protein characterization of the ICG/BPs by mass spectroscopy (MS), with protein abundance indicated by total coverage (%) within the sample.

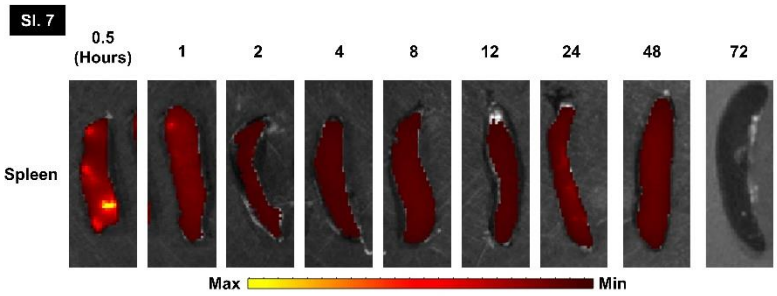




Supplementary Figure 4: Thermogravimetric analysis (TGA) of ICG/BP sample showing the one significant curve of weight loss (%), indicative of mass loss consistent with protein-only degradation.

Supplementary Figure 5: Resulting fluorescence output of each sample for Loading Efficiency (LE) testing. There is a significant increase in fluorescence when comparing the 5 and 10% samples, however there is no significant change from 10 to 15% and again from 10 to 20%, indicating a quenching effect after loading more than 10% ICG (w/w) into the BPs. (One way ANOVA followed by group post hoc comparison was performed on select data, statistical significance is quantified as: ****P < 0.0001; ***P < 0.001; **P < 0.01; *P < 0.05, ns = no significance).





Supplementary Figure 6: Fluorescence of ICG/BPs after 1 year of being kept in dark conditions at room temperature compared to ICG/BPs immediately after synthesis.

Supplementary Figure 7: *Ex vivo* fluorescence images of the spleen taken from the same animals in Figure 5B

Supplementary video 1: Dynamic SWIR imaging of ICG injection

Supplementary video 2: Dynamic SWIR imaging of ICG/BP injection