

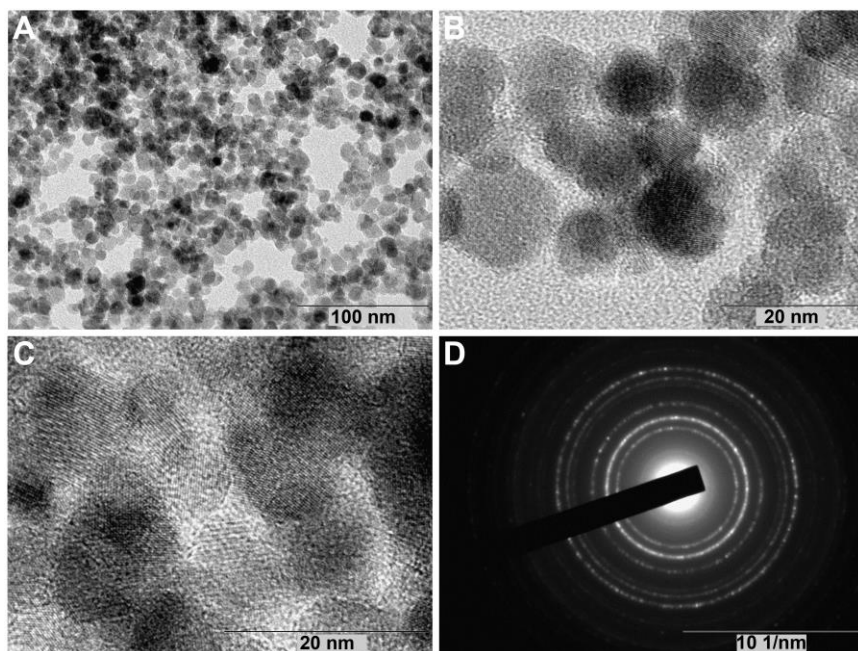
**Electronic supplementary information.**

**Table S1.**  $\zeta$ -potentials and hydrodynamic diameters of SPIONs.

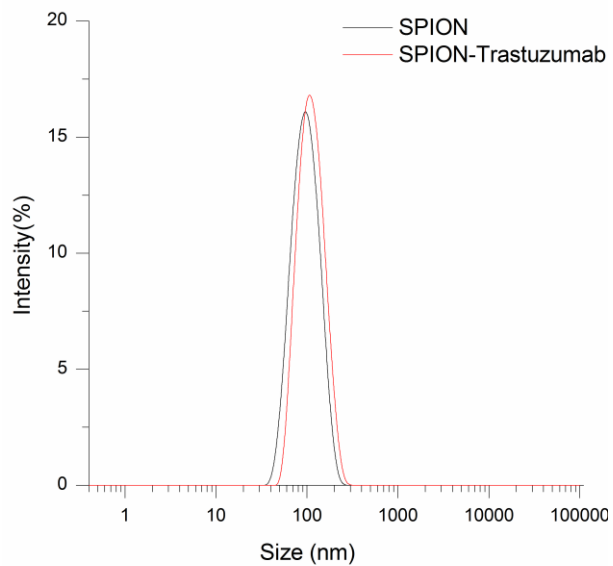
Particle notation	$\zeta$ -potential, mV	Diameter, nm
SPION	$-17.1 \pm 0.8$	$91 \pm 26$
SPION-Trastuzumab	$-8.9 \pm 0.9$	$105 \pm 31$
SPION-HumanIgG	$-13.4 \pm 0.8$	$99 \pm 28$
SPION-BSA	$-16.2 \pm 1.2$	$92 \pm 24$



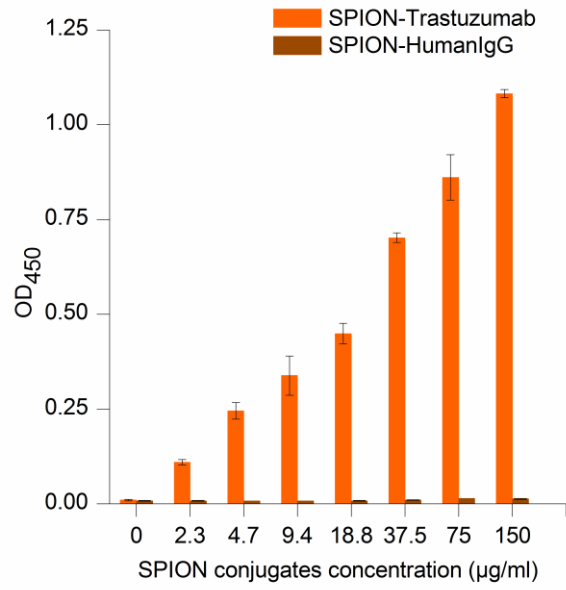
**Figure S1.** Photograph of the MPQ-cytometry device. Dimensions: 18 x 10 x 4 cm (H x W x D).



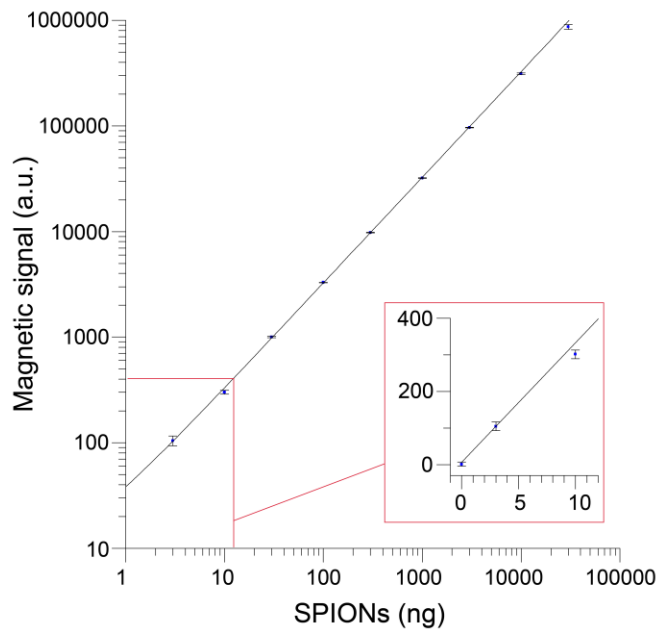
**Figure S2.** Transmission electron microscopy of SPIONs. **(A)** Bright-field electron micrograph. **(B, C)** HRTEM image of SPIONs on a lacey carbon film TEM grid. The morphology of SPIONs was studied with a JEM-7100 transmission electron microscope (JEOL Ltd.) with accelerating voltage of 200 kV. It can be seen that SPIONs consist of monocrystalline particles of  $10.9\pm 1.9$  nm and have almost spherical form. **(D)** SAED pattern of SPIONs. Rings correspond to 0.298, 0.253, 0.209, 0.173, 0.163, 0.149, 0.129, 0.478 nm. Electron diffraction data correspond to two crystalline modifications of iron oxide: maghemite  $\gamma\text{-Fe}_2\text{O}_3$  and magnetite  $\text{Fe}_3\text{O}_4$ .



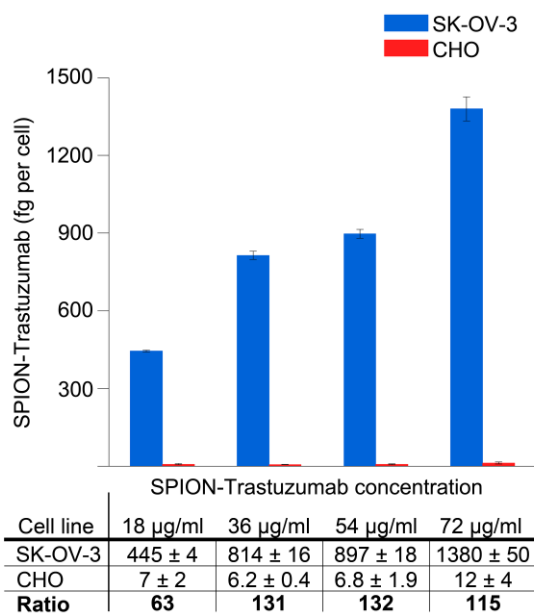
**Figure S3.** Distribution of hydrodynamic sizes of SPIONs ( $91 \pm 26$  nm) and SPION-Trastuzumab conjugates ( $105 \pm 31$  nm) determined by a Zetasizer Nano ZS analyzer (Malvern Instruments Ltd., UK).



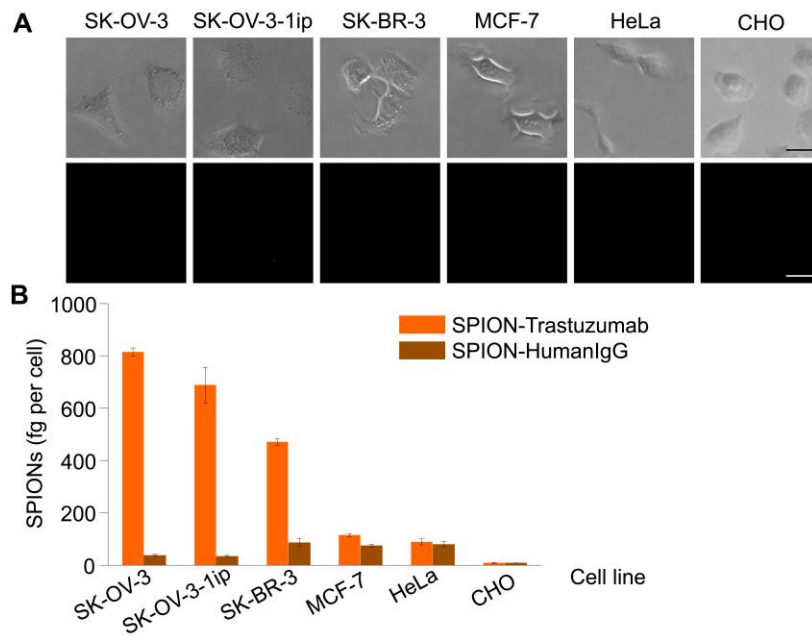
**Figure S4.** Immune-enzyme analysis of SPION-Trastuzumab activity (and that of SPION-HumanIgG as control) with HRP and *o*-phenylenediamine as substrate (measured at  $\lambda=450$  nm). Error bars are SD.



**Figure S5.** Calibration curve: a log-log dependence of the MPQ device readings on SPION content in a sample (with scale expansion inset in linear scale). A linear trend with  $R^2 = 0.9992$  is shown as a solid black line. Error bars are SD.



**Figure S6.** Dependence of the quantity of SPION-Trastuzumab bound to SK-OV-3 and CHO cells on concentration of the conjugates determined by the MPQ-cytometry for 4 test concentrations of nanoparticles: 18, 36, 54 and 72 µg/ml. The maximum achieved ratio of SPION-Trastuzumab bound with SK-OV-3 cells versus CHO cells is 132. Error bars are SD.



**Figure S7.** Control experiments for evaluation of HER2/neu expression levels on eukaryotic cells by different methods. **(A)** Imaging of the cells stained with SPION-HumanIgG-FITC by the fluorescence microscopy: top row – bright field, bottom row – fluorescence images in the same mode as for images in Fig.5 A as control. (Scale bars, 20  $\mu\text{m}$ ). **(B)** Femtograms of SPION-Trastuzumab and SPION-HumanIgG (as control) bound per cell quantified by the MPQ-cytometry for six cell lines. Error bars are SD.