**Electronic Supporting Information**

**Cobalt Ferrite Nanowhiskers as T₂ MRI Contrast agent**

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1.0 Materials

The chemical reagents used in the work were ferric chloride (FeCl₃•6H₂O), Cobalt (II) nitrate hexahydrate (CoN₃O₂•6H₂O), sodium hydroxide (NaOH) and Hydrochloric acid (HCl). All the chemicals were of analytical grade purchased from sigma Aldrich and were directly used without any further purification.

2.0 Characterization

The products were characterized and the structure of the nanowhiskers were determined from High resolution transmission electron microscope (HRTEM) (JEOL, JEM-ARM200F) and X-ray diffractometer (XRD) (PAN analytical, X'Pert Powder) using a Cu Ka radiation (λ=1.5406 Å). The magnetic studies were conducted on a superconducting quantum interference device (SQUID), (Quantum Design, MPMS SQUID-VSM). The zeta potential (ζ) of CfW in water, PBS and DMEM-FBS medium were measured with Zetasizer Nano ZS90 (Malvern instruments) at a wavelength of 633 nm with a 4.0 mW, solid-state He–Ne laser at a scattering angle of 90° at 25°C. Zeiss LSM 700 confocal microscope equipped with a 63X (N.A. 1.2) oil-immersion lens was used for collecting confocal z-series images. Images were processed with Zen 2012 Software.

3.0 Zeta potential measurements

To carry out zeta potential measurements, 700µl of solution was placed in a quartz cuvette for analysis. The sample was analysed continuously for 7 days to measure the zeta potential and hydrodynamic diameter in various mediums and also the stability of CfW in all 3 mediums by varying different pH 1-12 was determined as a function of the equilibrium pH using a universal zeta dip cell. The pH of these solutions was adjusted before the analysis process between 1 and 12 using pH meter.

4.0 MRI parameters

MRI experiments were performed with a 7T clinical Signa HDxt scanner (Varian). T₂-weighted images were acquired using the following parameters: 7 T, Repetition time TR = 2000 ms, Echo time TE = 15-250ms, FOV = 3*3cm, resolution 256 × 256 points and slice thickness = 4mm. And for T₁ measurements coronal spin-echo sequences with fixed echo time (TE) = 24 ms and varying repetition time (TR) (25 ms to 4 s) were used.

5.0 Phantom preparation

A pellet containing CfW labelled cells was mixed with 1.5ml of 0.5% agarose gel heated at 40°C. Then the CfW labeled cells are mixed with agar phantom and cooled at 4°C.
6.0 Cell culturing techniques
For MTT assay, L6 cells were grown in 35mm sterile cell culture petri dishes to approximately 70% confluency in CO2 incubator.

7.0 Results

**Fig.S1a** XRD pattern & b) SAED pattern of CfW

**Fig.S2** Variation of magnetization with applied magnetic field for the CfW at temperature 5K

**Fig.S3** Stability of CfW in Water and PBS at various pH 1-12
**Fig. S4** Zeta potential of CfW in various mediums

**Table 1** Value of Zeta potential ($\zeta$) and IEP of CfW dispersed in distilled H$_2$O, PBS and DMEM-2%FBS

<table>
<thead>
<tr>
<th>Samples</th>
<th>Zeta potential pH=7.4 (mV)</th>
<th>IEP</th>
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<tbody>
<tr>
<td>Distilled H$_2$O</td>
<td>-11.8</td>
<td>2.8</td>
</tr>
<tr>
<td>PBS</td>
<td>-29.6</td>
<td>4.4</td>
</tr>
<tr>
<td>DMEM-2%FBS</td>
<td>-35.9</td>
<td>-</td>
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