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MDPI

Supplementary Materials: Amphiphilic P(OEGMA-Co-DI-PAEMA) Hyperbranched Copolymer/Magnetic Nanoparticle Hybrid Nanostructures by Co-Assembly

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1. Characterization of $CoFe_2O_4$

DLS and XRD experiments were accomplished to determine the size, and the crystalline structure of MNPs. Table S1 presents the hydrodynamic radius (R_h) and size polydispersity index (PDI) of the MNPs. DLS data revealed MNPs of 8nm in hexane.

Table S1. DLS at 90° of the $CoFe_2O_4$ magnetic nanoparticles.

Sample	R_h (nm)	PDI
$CoFe_2O_4$ NPs	8	0.39

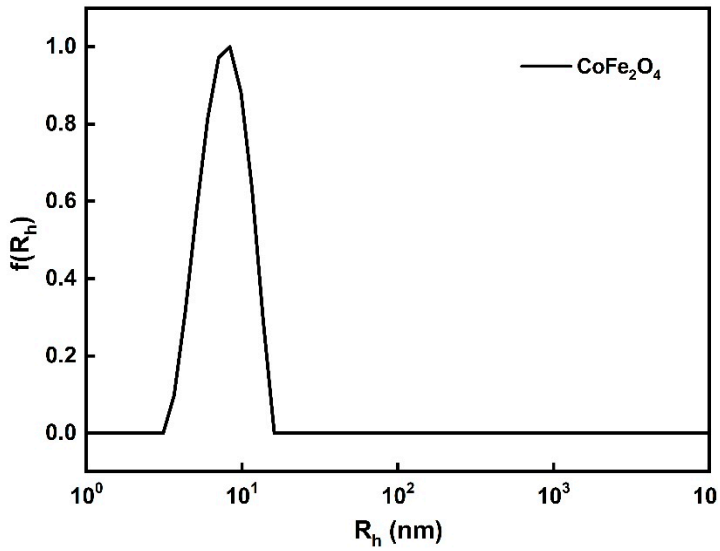

Figure S1. DLS size distribution for the hydrophobic MNPs in hexane at 90° measuring angle.

The crystalline structure of $CoFe_2O_4$ magnetic nanoparticles was characterized by XRD. The XRD pattern in Figure S2 presents the strong reflections (220), (311), (222), (400), (422), (511) and (440). The analysis of XRD pattern verify the single-phase cubic spinel structure that corresponds to fcc and is consistent with the standard data of $CoFe_2O_4$ (JCPDS no. 79–1744) and literature [1].

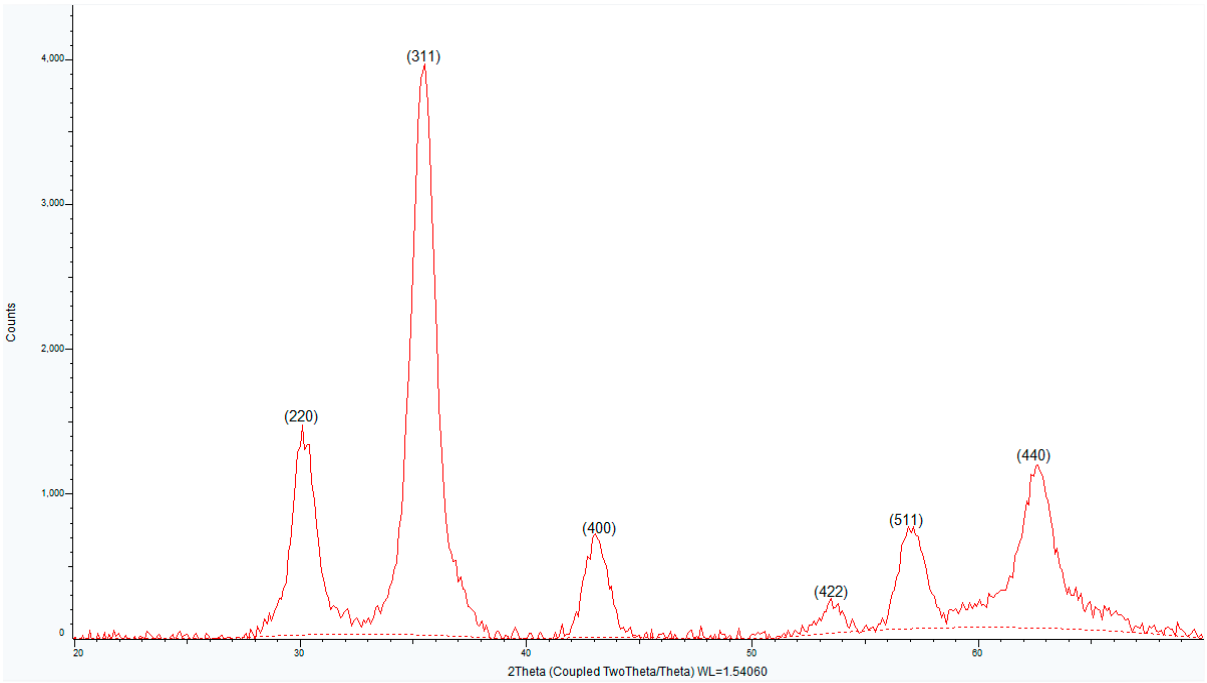

Figure S2. XRD pattern of MNPs.

2. Cryo-TEM analysis of the HB/MNPs and HB/MNPS/CUR hybrid nanostructures

Cryo-TEM measurements presented a clearer picture of the morphology of the mixed hybrid nanostructures. The experiments were recorded at a concentration of 1 x 10^{-3} g/mL. Figure S3 shows Cryo-TEM images of the HB3 copolymer with different contents of MNPs. It is observed that the high content of MNPs in the copolymer solution results in better-defined mixed aggregates. In both cases it appears that irregular spherical structures of the particles are formed, but by increasing the concentration of MNPs the decoration of the mixed particles is observed.

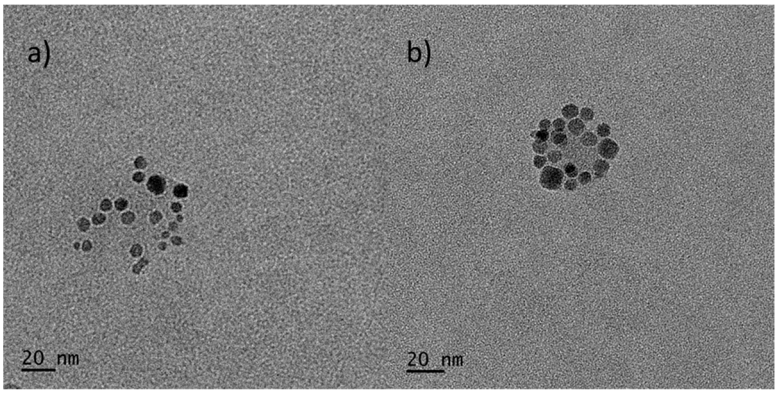

Figure S3. Cryo-TEM images of the HB3/MNPs hybrid nanostructures with (**a**) 10wt% MNPs and (**b**) 30wt% MNPs content.

Figure S4 represents the HB2/MNPs hybrid nanostructures. The HB2 copolymer is less hydrophobic resulting in the particles being looser and may have the potential to interact with the MNPs to form large aggregates. Also, in the case where the content of MNPs increases (Figure S4b), smaller primary nanoparticles seem to be formed with sizes 30–75nm having MNPs placed on their surface.

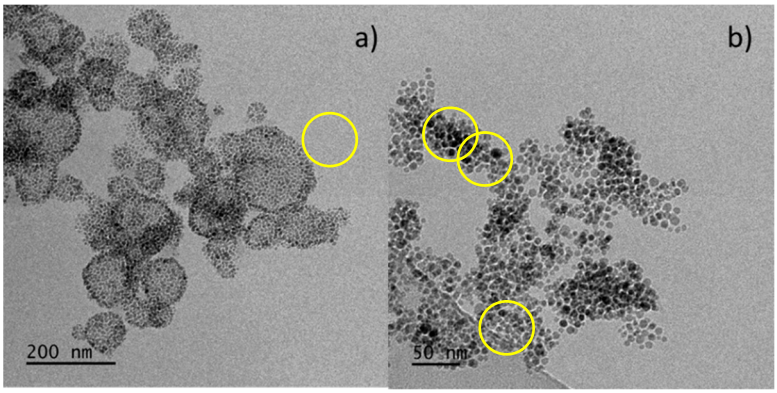

Figure S4. Cryo-TEM images of the HB2/MNPs hybrid nanostructures with (**a**) 10wt% MNPs and (**b**) 30wt% MNPs contents (yellow circles denote primary particles).

References

1. Zhao, S.; Ma, D.; Jin, W. Preparation of $CoFe_2O_4$ Nanocrystallites by Solvothermal Process and Its Catalytic Activity on the Thermal Decomposition of Ammonium Perchlorate. *J. Nanomater.* **2010**, *2010*, 28.