Journal Name

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ARTICLE

Supplementary

S1 For the evaluation of the final concentration of nanoparticles in the suspension, it was dissolved in nitric acid (v:v) 1:1 at 70 ^{o}C, and the volume was adjusted to 50 ml by deionized water. The concentration of ions in the solution was determined by IP-AES method on the iCAP 6300 Duo (Thermo Scientific) device. As a standard, scandium was used. The stoichiometric ratios of iron and cobalt in the ferrite as well as the cobalt ferrite concentration in the suspension were calculated according to the received data using the formula:

$$C=Mr\,[Co]\,Ar_{Co}^{-1}\,X^{-1,} \quad (1)$$

where C is $Co_xFe_{2-x}O_4$ concentration in the solution, g / L;
Mr is molecular weight of $Co_xFe_{2-x}O_4$;
[Co] is the Co ion concentration in the suspension, g / L;
Ar_{Co} is cobalt's atomic weight; and
X is the stoichiometric coefficient of cobalt.

S2 The optical density was measured at wavelengths from 200 to 340 nm. The ODN concentration in the solution (C, mol / L) was calculated according to the formula (8):

$$C= (OD_{max} - OD_{320})\,K^{-1,} \quad (2)$$

where OD_{max} is the optical density of the solution at λ_{max} (Table 1a, b),
OD_{320} is the optical density of the solution at λ=320, and
ε is the molar extinction coefficient (L mol^{-1} cm^{-1}),

Table 1a – The values of the ε coefficient for ODNs

oligonucleotide	λ_{max}	ε
dA_{18}	257	225234.7
dC_{18}	270	144691.1
dG_{18}	253	215471.9
dT_{18}	266	154614.0
dA_{80}	257	991741.0
dC_{80}	275	616720.9
dT_{80}	266	686288.5
$dG_{18}T_{25}$	260	386100.0
$dN_{22}dA_{25}$	260	515600.0
$dN_{21}dA_{25}$	260	509600.0

Table 1b – The values of the ε coefficient for dNTPs

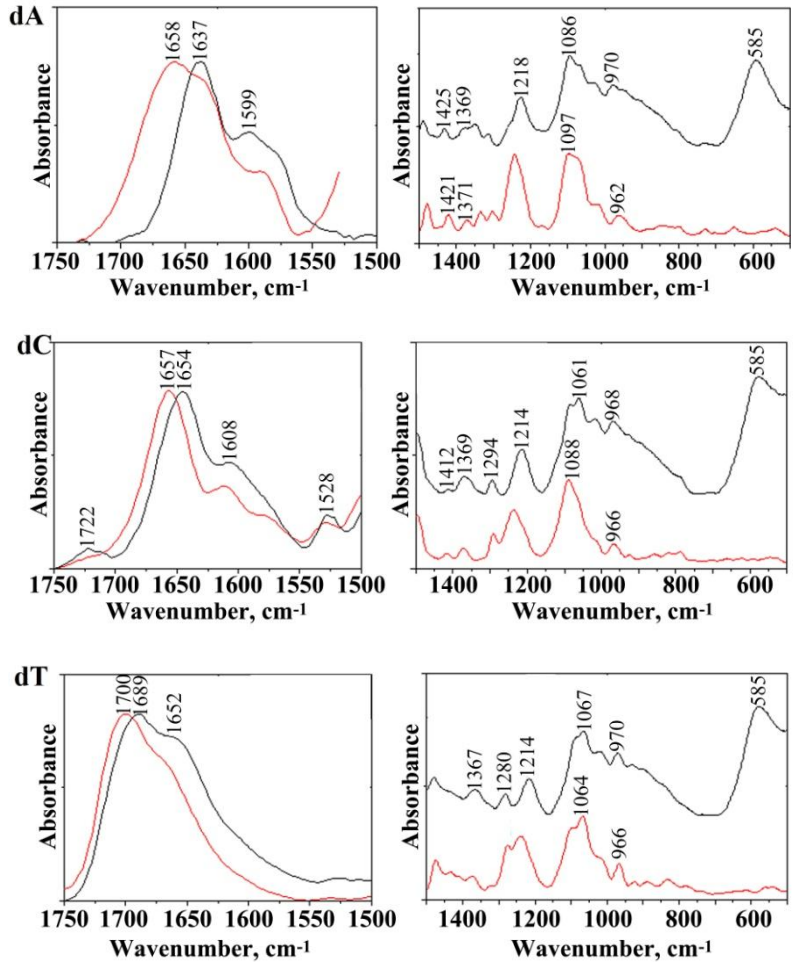
dNTP	λ_{max}	ε
dATP	259	15200.0
dCTP	271	9300.0
dGTP	253	13700.0
dTTP	267	9600.0

The number of ODNs bound to 1 g of nanoparticles (A) was calculated according to the formula:

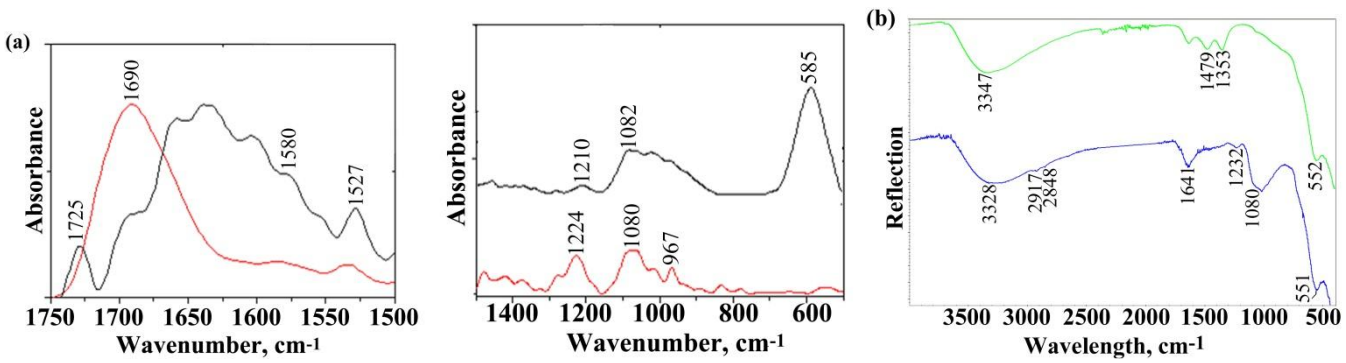
$$A=(C_i - C_o)\,V\,m^{-1,} \quad (3)$$

where C_i is the original concentration of ODN in the solution, mol / L;
C_o is the concentration of unbound ODN in the supernatant after themagnetic separation of the nanoparticles (equilibrium concentration), mol / L;
V is the volume of the reaction mixture, L; and
m is the mass of nanoparticles in the solution, g.

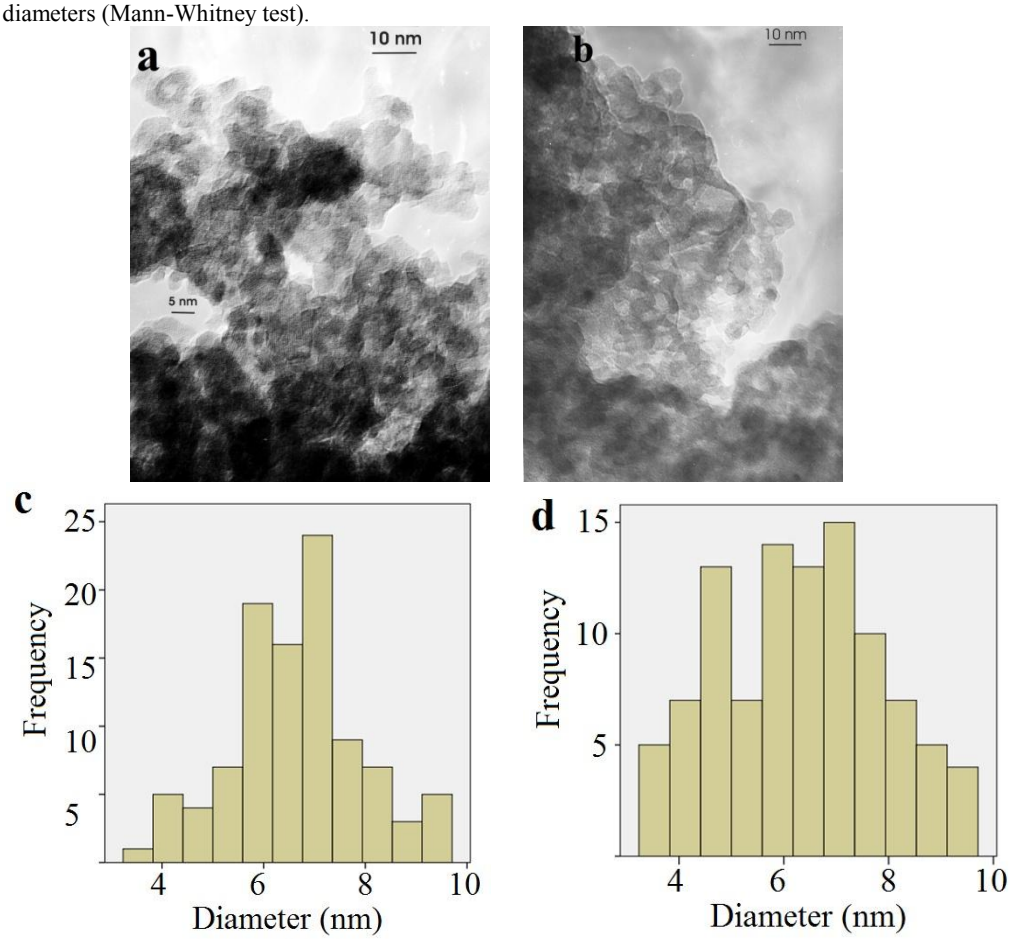
S3 ATR-FTIR spectra of dA_{18}, dC_{18}, dT_{18} (red curve) and nanoconjugates CFNP-dA_{18}, CFNP-dC_{18}, CFNP-dT_{18} obtained in 8 mM tris, pH 6.5 (black curve) in the region 1750-1500 cm^{-1} (D_2O) and 1500-500 cm^{-1} (H_2O)



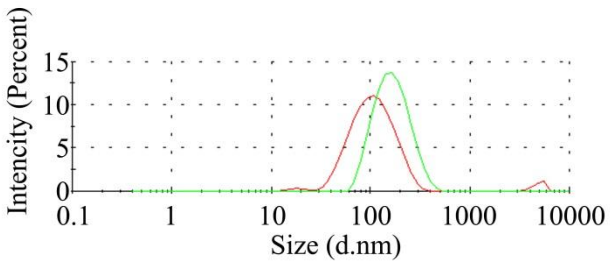
S4 – (**a**) Solution ATR-FTIR spectra of $dG_{18}T_{25}$ (red curve) and nanoconjugate CFNP-$dG_{18}T_{25}$ obtained in PBS-tris buffer (black curve) in the region 1750-1500 cm^{-1} (D_2O) and 1500-500 cm^{-1} (H_2O) (**b**) ATR-FTIR spectra of lyophilized CFNP (green curve) and nanoconjugate CFNP-$dG_{18}T_{25}$ obtained in PBS-tris buffer (blue curve)



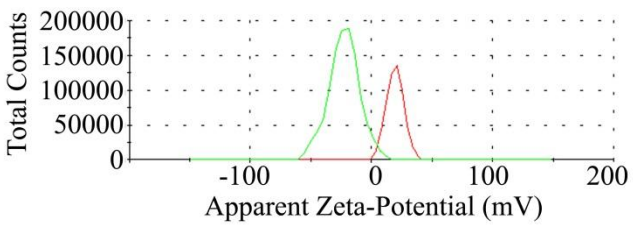
S5 TEM image of (a) CFNP and (b) CFNP-$dG_{18}T_{25}$ nanoconjugate; number frequency histogram of the size (diameter) distribution of (c) CFNP and (d) the CFNP-$dG_{18}T_{25}$ nanoconjugate. The particle size data are based on the image analysis of 100 particles. The average nanoparticle diameter is 6.7±1.3 nm. There are no significant differences (p=0.13) between the nanoparticle and nanoconjugate average diameters (Mann-Whitney test).



S6 Size distribution by intensity of CFNP (red line) and the CFNP-$dG_{18}T_{25}$ nanoconjugate (green line) in 8 mM tris



S7 z-potential distribution of CFNP (red line) and the CFNP-$dG_{18}T_{25}$ nanoconjugate (green line), in 8 mM tris



S8 Change of z-potential at different final pH values (adjusted by HCl) of the CFNP-suspension in 10 mM tris (22.6 ^{o}C)

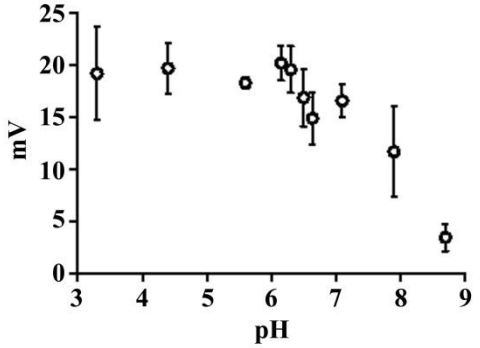


Table S9 – Average diameter and z-potential of nanoparticles and nanoconjugates in 10 mM tris

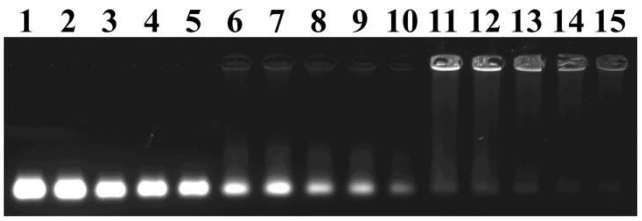
Sample	D (z-average), nm	PDI	z-potential, mV
CFNP ($Co_{0.7}Fe_{2.3}O_4$)	96.9	0.283	19.2
CFNP-$dG_{18}T_{25}$	150.6	0.128	-22.7

Table S10- Structural parameters of CFNP and the CFNP-$dG_{18}T_{25}$ nanoconjugate

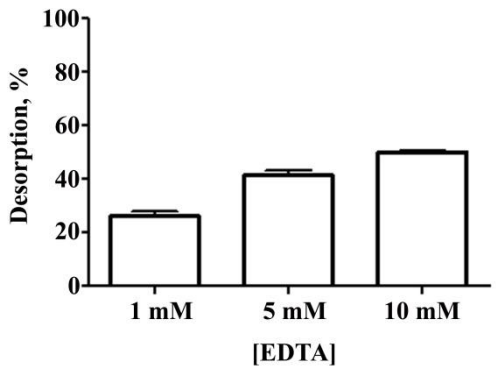
Composition	Content, % vol.			Lattice parameter*, A	Average particle size, nm	$\Delta d/d * 10^{-3}$
	Spinel phase	Hematite	Amorphous phase			
$Co_{0.7}Fe_{2.3}O_4$	92	3	5	A=8.3794	8.6	7.7
$Co_{0.7}Fe_{2.3}O_4$-$dG_{18}T_{25}$	72	3	25	A=8.3811	9.6	9.7

***** Lattice parameter for spinel phase; Lattice parameter for hematite phase A=5.1350, C=13.8400

S11 Gel electrophoresis analysis in 1.2% agarose (Epi red with FRLP emission filter) **lines 1-5**: control probe Cy5-$dN_{21}dA_{25}$ in the concentration from 0.5 to 0.1 μM, **lines 6-10**: elution of Cy5-$dN_{21}dA_{25}$ from CFNP-$dG_{18}T_{25}$, **lines 11-15**:CFNP-$dG_{18}T_{25}$,CFNP-$dG_{18}T_{25}$-$dN_{21}dA_{25}$ nanoconjugate obtained after hybridization with Cy5-$dN_{21}dA_{25}$ in the concentration from 0.5 to 0.1 μM



S12 Desorption efficiency of $dG_{18}T_{25}$ oligonucleotide from the CFNP surface under treatment with 1-10 mM EDTA in 10 mM tris.



S13

$$S = 6*10^{-4}\,\gamma^{-1}\,d^{-1}, \quad (4)$$

S – specific surface area, m^2 / g,
γ – density, g / cm^3,
d – particle diameter, cm.