Research Article

# DSC study of the effects of charge-modified PEG-coated iron-oxide nanoparticles on the $L_\beta$-to-$L_\alpha$ phase-transition of DPPC multilamellar vesicles

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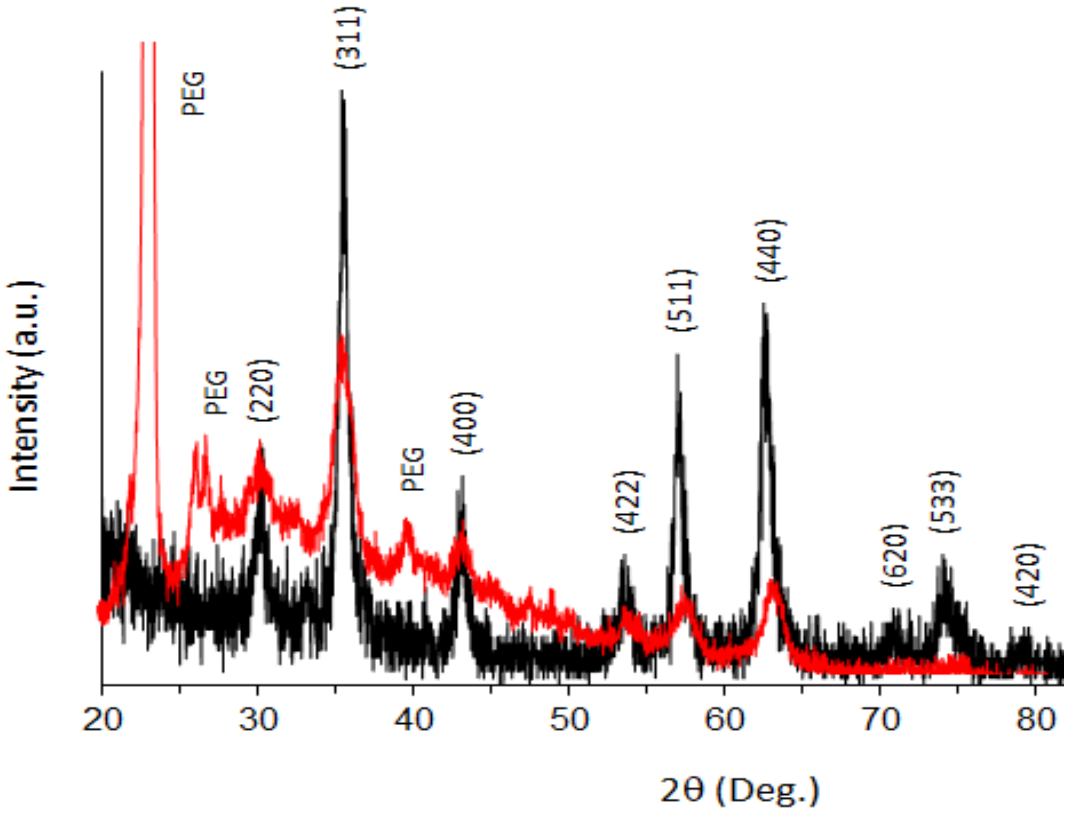
## SUPPLEMENTARY DATA

**X-ray diffraction patterns of uncoated and PEG coated IONPs**

The XRD pattern of dried uncoated as-synthesized (Ghosh et al. [22]) IONPs (black plot), which was indexed with $Fe_3O_4$ phase [JCPDS card no. 82-1533]. The recent XRD pattern of the PEG coated IONPs (red plot), prepared in 2013, Ghosh et al. [22].




**S 1:** XRD patterns of as-synthesized uncoated (black) and PEG (red) coated IONPs. Peaks could be indexed with $Fe_3O_4$ phase for the uncoated IONPs, and the extra peaks in the red pattern were due to PEG.



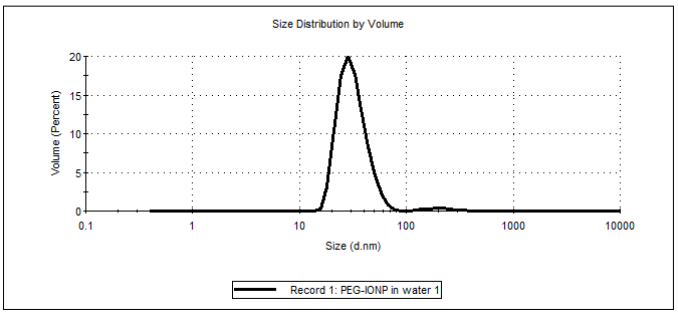
Protein Affinity and Effects of Charge-Modified PEGylated Iron-Oxide Nanoparticles on Lβ-to-Lα Phase-Transition of DPPC Multilamellar Vesicles: A DSC Study. Nanomedicine And Nanotechnology Journal. 2022; 5(1):133.

## DLS size distribution of PEG-IONPs, TLC-PEG-IONPs and CPI-PEG-IONPs

| | | | |
|---|---|---|---|
| **Sample Name:** | PEG-IONP in water 1 | | |
| **SOP Name:** | mansettings.nano | | |
| **File Name:** | 1 28jan2012 DLS ZET.dts | **Dispersant Name:** | Water |
| **Record Number:** | 1 | **Dispersant RI:** | 1.330 |
| **Material RI:** | 1.00 | **Viscosity (cP):** | 0.8872 |
| **Material Absorbtion:** | 0.100 | **Measurement Date and Time:** | 28 January, 2021 11:49:07 AM |
| **Temperature (°C):** | 25.1 | **Duration Used (s):** | 60 |
| **Count Rate (kcps):** | 363.1 | **Measurement Position (mm):** | 4.65 |
| **Cell Description:** | Glass cuvette with square aperture | **Attenuator:** | 9 |

| | | Size (d.nm): | % Volume: | St Dev (d.nm): |
|---|---|---|---|---|
| **Z-Average (d.nm):** 99.59 | **Peak 1:** | 31.94 | 98.0 | 9.824 |
| **PdI:** 0.205 | **Peak 2:** | 202.5 | 2.0 | 62.41 |
| **Intercept:** 0.945 | **Peak 3:** | 0.000 | 0.0 | 0.000 |

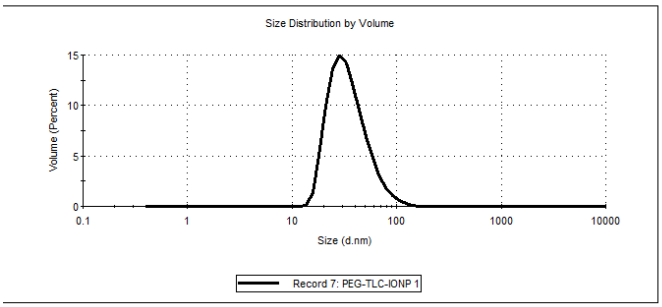
**Result quality :** Refer to quality report




| | | | |
|---|---|---|---|
| **Sample Name:** | PEG-TLC-IONP 1 | | |
| **SOP Name:** | mansettings.nano | | |
| **File Name:** | 1 28jan2012 DLS ZET.dts | **Dispersant Name:** | Water |
| **Record Number:** | 7 | **Dispersant RI:** | 1.330 |
| **Material RI:** | 1.00 | **Viscosity (cP):** | 0.8872 |
| **Material Absorbtion:** | 0.100 | **Measurement Date and Time:** | 28 January, 2021 12:09:49 PM |
| **Temperature (°C):** | 25.0 | **Duration Used (s):** | 70 |
| **Count Rate (kcps):** | 240.7 | **Measurement Position (mm):** | 4.65 |
| **Cell Description:** | Glass cuvette with square aperture | **Attenuator:** | 8 |

| | | Size (d.nm): | % Volume: | St Dev (d.nm): |
|---|---|---|---|---|
| **Z-Average (d.nm):** 50.56 | **Peak 1:** | 36.46 | 100.0 | 17.22 |
| **PdI:** 0.172 | **Peak 2:** | 0.000 | 0.0 | 0.000 |
| **Intercept:** 0.951 | **Peak 3:** | 0.000 | 0.0 | 0.000 |

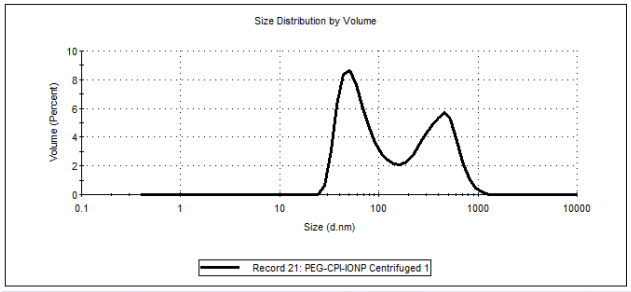
**Result quality :** Good




| | | | |
|---|---|---|---|
| **Sample Name:** | PEG-CPI-IONP Centrifuged 1 | | |
| **SOP Name:** | mansettings.nano | | |
| **File Name:** | 1 28jan2012 DLS ZET.dts | **Dispersant Name:** | Water |
| **Record Number:** | 21 | **Dispersant RI:** | 1.330 |
| **Material RI:** | 1.00 | **Viscosity (cP):** | 0.8872 |
| **Material Absorbtion:** | 0.100 | **Measurement Date and Time:** | 28 January, 2021 12:55:29 PM |
| **Temperature (°C):** | 25.0 | **Duration Used (s):** | 60 |
| **Count Rate (kcps):** | 301.4 | **Measurement Position (mm):** | 4.65 |
| **Cell Description:** | Glass cuvette with square aperture | **Attenuator:** | 8 |

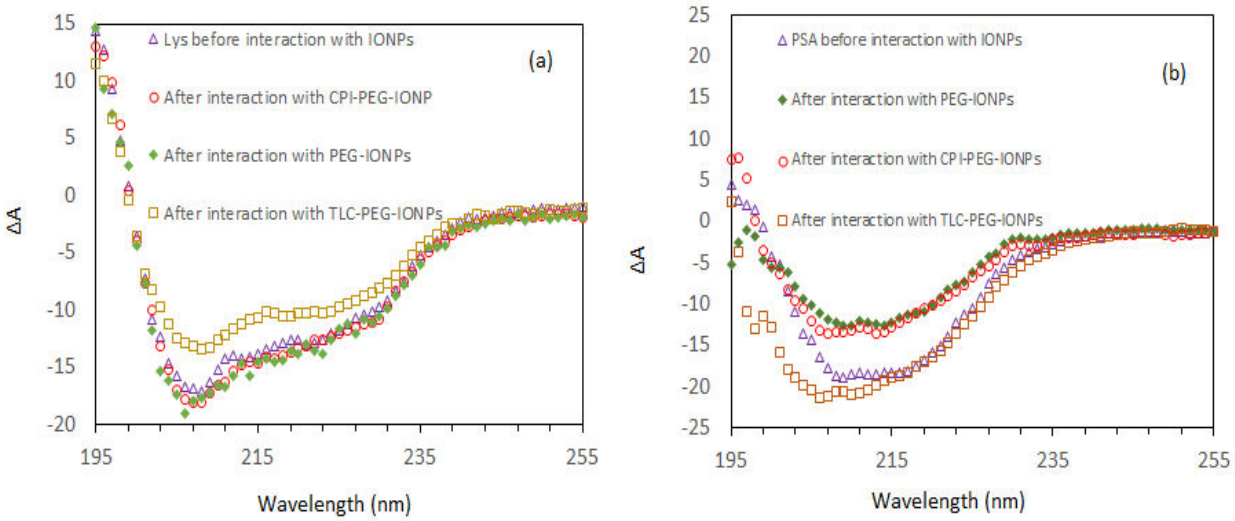
| | | Size (d.nm): | % Volume: | St Dev (d.nm): |
|---|---|---|---|---|
| **Z-Average (d.nm):** 142.7 | **Peak 1:** | 67.82 | 57.6 | 32.79 |
| **PdI:** 0.309 | **Peak 2:** | 414.6 | 42.4 | 177.0 |
| **Intercept:** 0.943 | **Peak 3:** | 0.000 | 0.0 | 0.000 |

**Result quality :** Good



**Circular dichroism plots of Lys and PSA**

For CD experiments, the ratio of protein:nanoparticles were taken as 1:1 (v/v) from the stock solutions as mentioned in the manuscript.




**S 2:** CD plots of proteins before and after interaction with unmodified and charge-modified PEG-IONPs for (a) Lys and (b) PSA.



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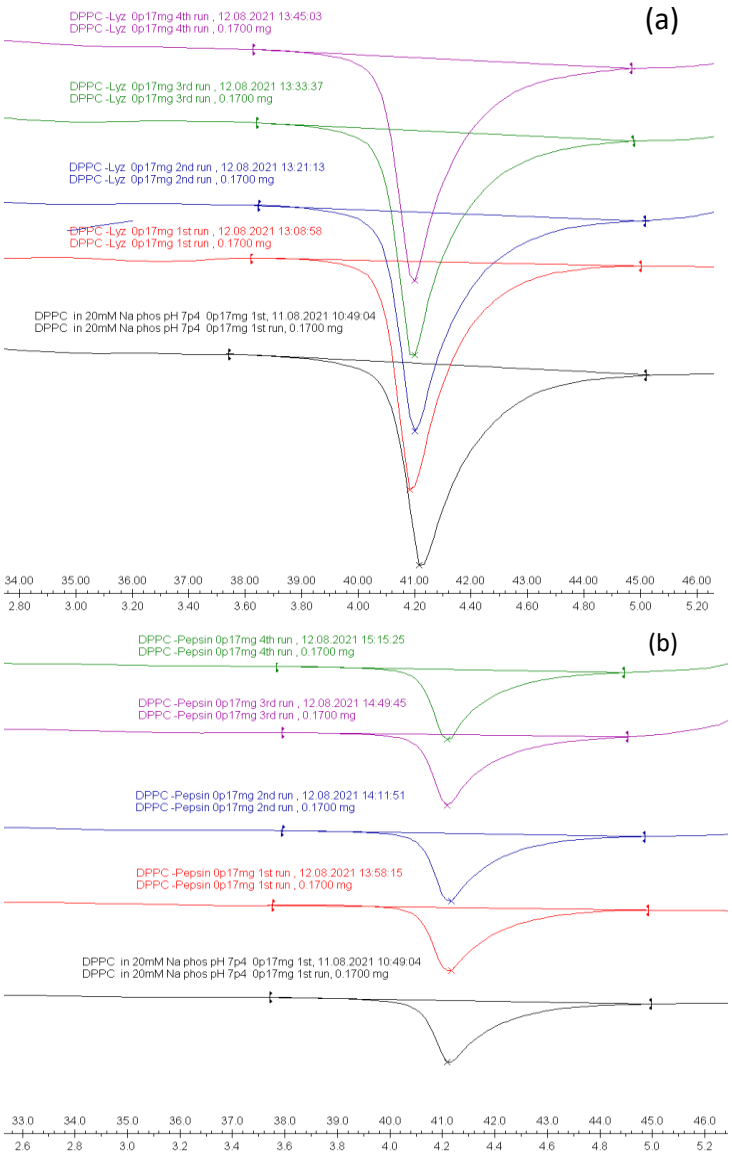
**DSC endotherms of DPPC with Lys and PSA**




**S 3:** DSC endotherms of DPPC with (a) Lys and (b) PSA.

**Table:** DSC data for DPPC with (a) Lys and (b) PSA

| Sample | $T_m$ (°C) | ΔH (J/g) |
|---|---|---|
| DPPC | 40.76 ± 0.3 | 38.61 ± 0.5 |
| Lys + DPPC | 40.66 ± 0.1 | 38.48 ± 0.7 |
| PSA + DPPC | 40.79 ± 0.2 | 38.66 ± 0.3 |