

SUPPLEMENTARY MATERIALS

Nanoparticles with a specific size and surface charge promote disruption of the secondary structure and amyloid-like fibrillation of human insulin under physiological conditions

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14 **Keywords: nanomaterials, protein adsorption, quantum dots, proteinopathies, insulin,**
15 **fibrillation, amyloidosis, Alzheimer's disease, Parkinson's disease.**

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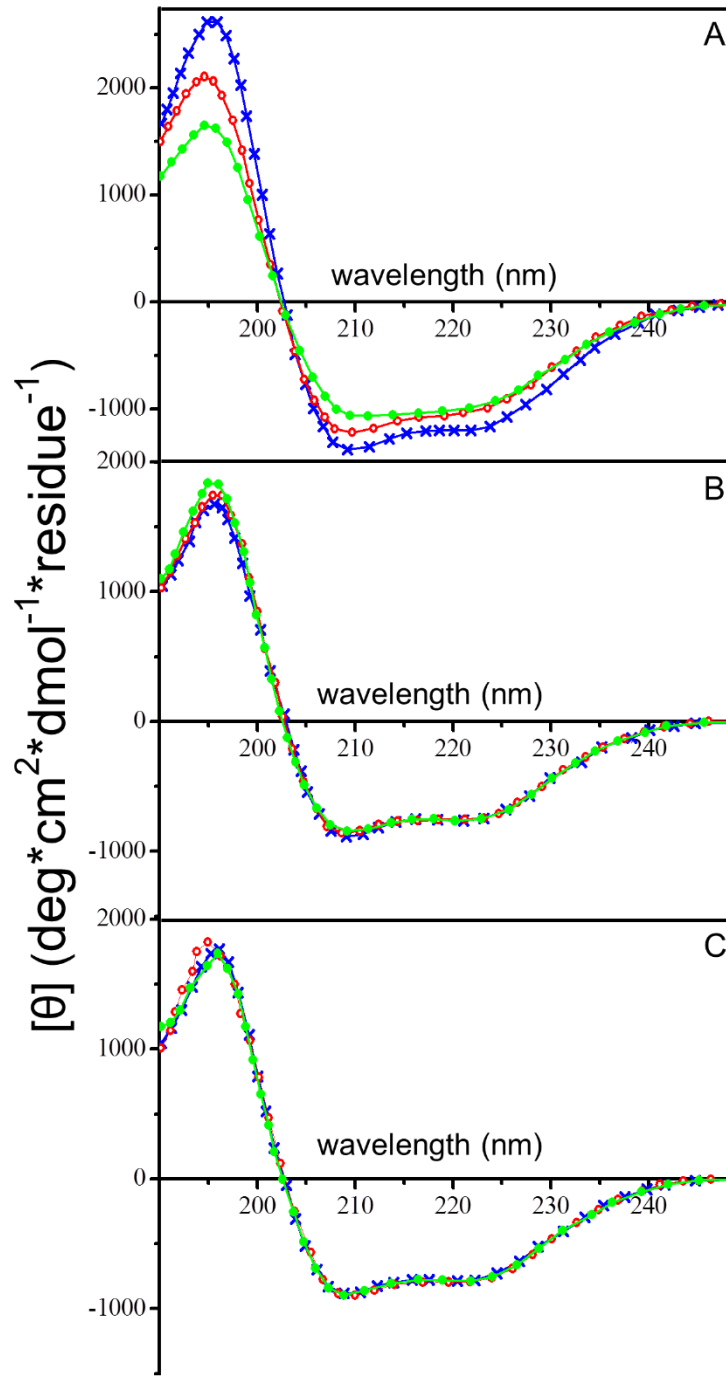
17 **Supplementary Figures:**

18 **Supp-Fig. 1:** Changes in the human insulin secondary structure in the presence of CdSe/ZnS QDs
19 with different surface modification and the same hydrodynamic diameters (12 nm, Table 1).

20 **Supp-Fig. 2:** Changes in the human insulin secondary structure in the presence of PEG-OH-modified
21 CdSe/ZnS QDs of different diameters (Table 1).

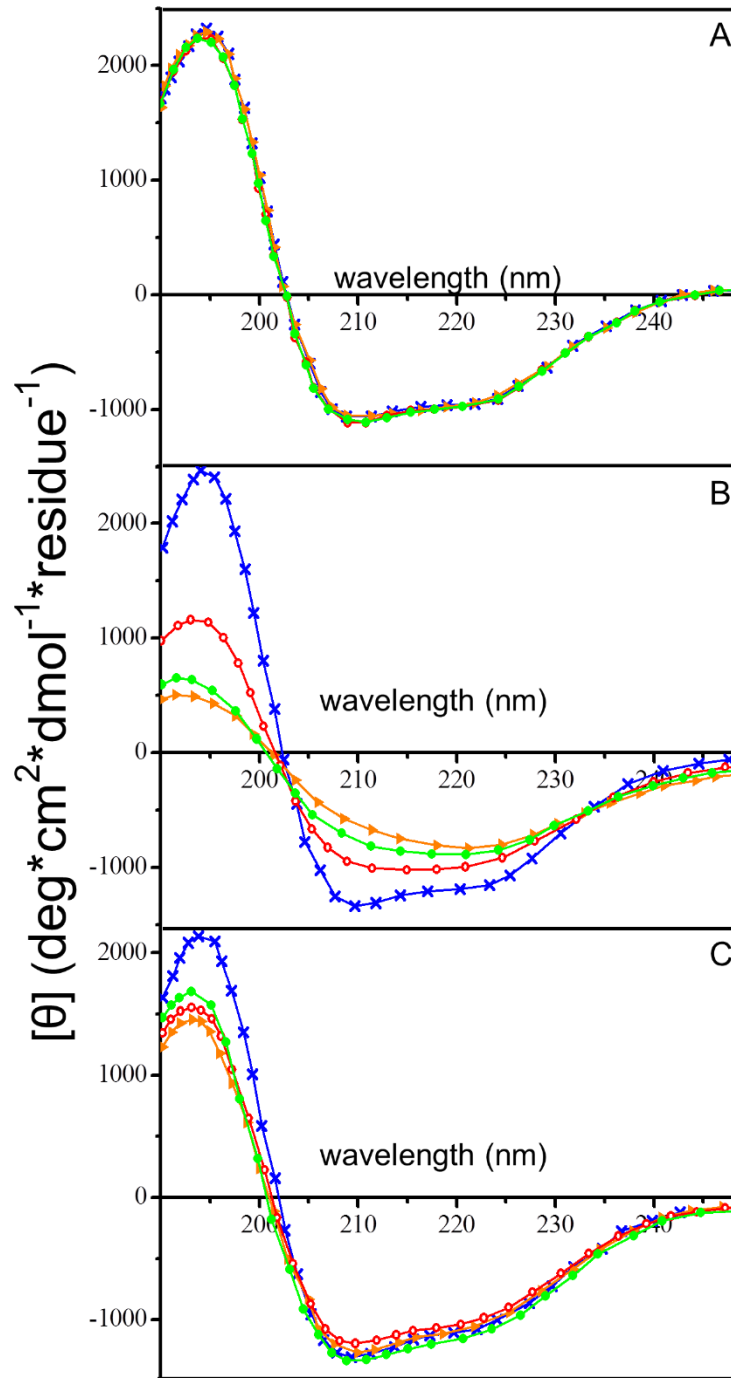
22 **Supp-Fig. 3:** Changes in the human insulin secondary structure in the presence of different
23 concentrations of PEG-OH-modified CdSe/ZnS QDs of 12-nm hydrodynamic diameter (Table 1).

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 26 **Supp-Fig. 1.** Changes in the human insulin secondary structure in the presence of CdSe/ZnS QDs
 27 with different surface modification and the same hydrodynamic diameters (12 nm, Table 1).

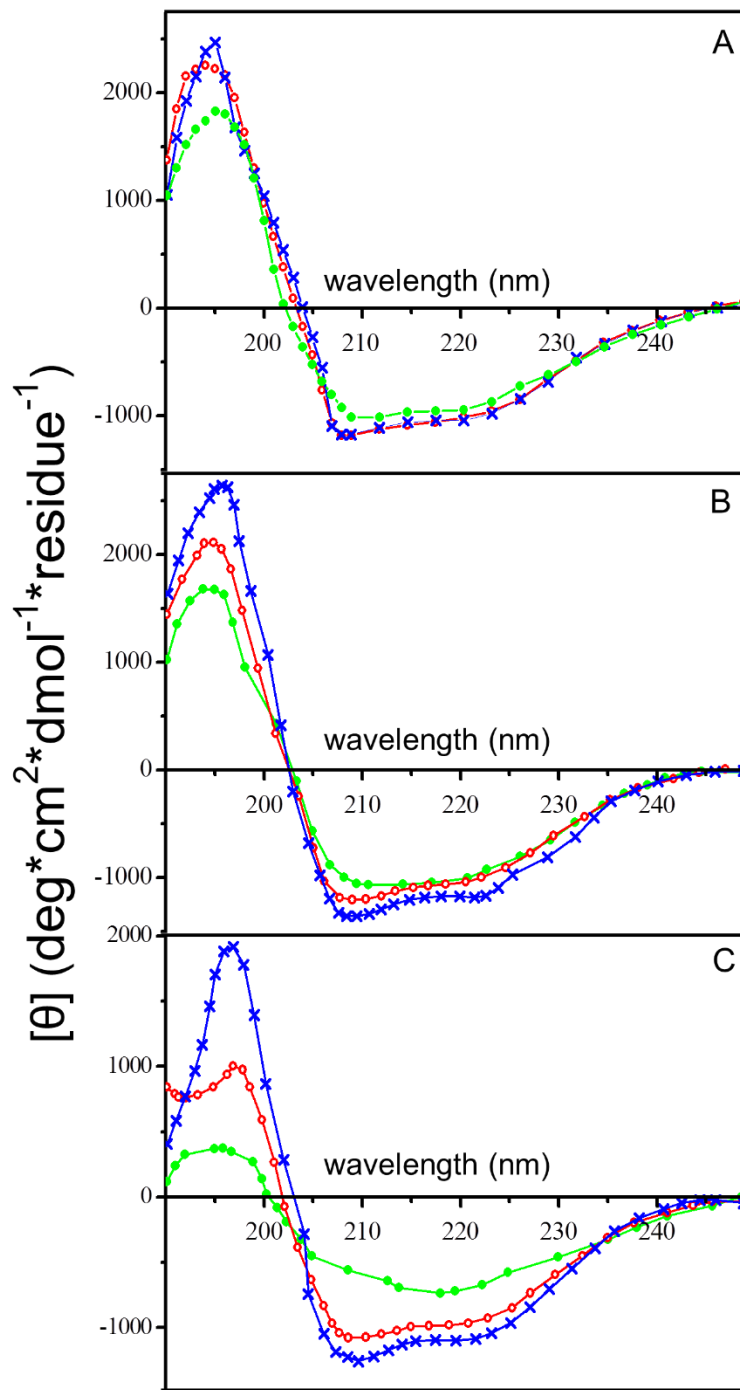
28 The circular dichroism spectra of human insulin (2 mg/ml) were recorded in the presence of 3.44 μM
 29 of CdSe/ZnS QDs modified with PEG-OH (A), PEG-COOH (B), and PEG-OH/PEG-NH₂ (C). The
 30 reaction mixtures were incubated for 24 h in a 10 mM sodium phosphate buffer solution (pH 7) at
 31 37°C, and CD spectra were recorded after 0 (blue), 12 (red), and 24 h (green) of incubation.



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 33 **Supp-Fig. 2.** Changes in the human insulin secondary structure in the presence of PEG-OH-modified
 34 CdSe/ZnS QDs of different diameters (Table 1).

35 The circular dichroism spectra of human insulin (2 mg/ml) were recorded in the presence of 3.44 μ M
 36 of QDs with hydrodynamic diameters of 9 nm (A), 12 nm (B), or 15 nm (C) nm (Table 1).

37 All solutions were incubated for 3 days in a 10 mM sodium phosphate buffer solution (pH 7) at 37°C,
 38 and CD spectra were recorded after 0 (blue), 1 (red), 2 (green), and 3 (orange) days of incubation.



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 40 **Supp-Fig. 3.** Changes in the human insulin secondary structure in the presence of different
 41 concentrations of PEG-OH-modified CdSe/ZnS QDs of 12-nm hydrodynamic diameter (Table 1).

42 The circular dichroism spectra of human insulin (2 mg/ml) were recorded in the presence of different
 43 concentrations of QDs: 0.86 μM (A), 3.44 μM (B), and 13.76 μM (C). All solutions were incubated
 44 in a 10 mM sodium phosphate buffer (pH 7) at 37°C for 24 h, and CD spectra were recorded after 0
 45 (blue), 12 (red), and 24 h (green) of incubation.