

239 Effect of hollow gold nanoparticles on β -amyloid fiber formation in presence of near-infrared irradiation

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Amyloidogenesis is a very interest topic for scientists due to its devastating role in neurodegenerative diseases such as Alzheimer's and Parkinson's disease. Peptide aggregation into amyloid fibrils is a multistep process that finally affects the brain depositing amyloid proteins and plaques in the extracellular matrix [1].

Hollow gold nanospheres (HGNs) are chosen as a possibility to inhibit the β -amyloid fibrils formation with irradiation because they have, in comparison to solid nanospheres, the advantage of a tuneable absorption in the near-infrared (NIR), where the absorption of the constituents of the biological tissue is lowest [2].

The use of HGNs with a diameter of about 40 nm that exhibit an absorbance maximum at around 800 nm were obtained by a galvanic replacement reaction of cobalt nanoparticles and HAuCl_4 in the presence of sodium citrate as stabilizing ligand. HGNs were conjugated with CLPFFD-peptide because this peptide contains the CLPFFD sequence that attaches selectively to the amyloidogenic $\text{A}\beta_{1-42}$ structures [3].

In this work, we studied the effect of HGNs-CLPFFD on β -amyloid fibrils formation in presence of NIR irradiation (808 nm, 450 mW continuous laser). The irradiation process was done for 2 h and after irradiation, the samples were placed in a thermomixer for 48 h at 37 °C and 300 rpm. The formation of fibrils was evaluated by using thioflavin-T fluorescence assay. In this assay, the amount of fibrils in suspension can be quantified by measuring the intensity of the fluorescence signal, which is proportional to the amount of formed fibrils. The results showed that independently of NIR

irradiation the presence of HGNs-CLPFFD decrease until 60 % the fluorescence of thioflavin-T indicating that HGNs-CLPFFD affects considerably the β -amyloid fibrils formation (Fig. 1).

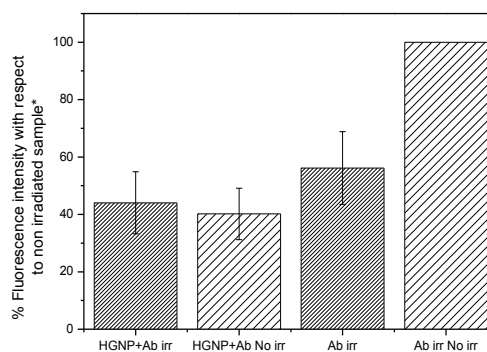


Fig. 1 Normalized fluorescence intensity signal from irradiated and non-irradiated samples of β -amyloid fibrils in presence of HGNPs-CLPFFD.

The inhibitory effect of HGNs-CLPFFD in the amyloidogenesis process is supplemented by NIR irradiation. Transmission electron microscopy and SDS-PAGE electrophoresis were also evaluated.

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