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POSTER ABSTRACT PRESENTATIONS

SESSION TITLE: EM RESEARCH RELATED TO MEDICINE

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Abstract P-39: Fluorescent Silver Nanoclusters with Immunoglobulins and Albumins

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Background: Multiplex biomedical assays including molecular genetic tests and immunoanalysis require multiple fluorophores with a wide excitation range and different emission spectra. In comparison with organic fluorophores and quantum dots, the metal nanoclusters (NC) consisting of a few to hundred atoms have the following advantages: small size, large Stokes shift, prolonged fluorescence lifetime and biocompatibility. Our research was aimed at construction of fluorescent AgNC with the main blood proteins and transmission electron microscopy (TEM).

Methods: AgNC were synthesized from $AgNO_3$ in the presence of albumins and immunoglobulins (Ig) of different classes and origin at pH 9-11 with $NaBH_4$ recovery. The resulting AgNC with proteins were loaded to "Formvar/Carbon 200 Mesh Copper" copper grids (Ted Pella, USA) and examined using TEM system JEM 2100 Plus (JEOL, Japan) without contrast. Fluorescence excitation/emission spectra were measured in quartz cuvette using the FluoroMax + spectrofluorometer (Horiba Scientific, Japan).

Results: Recovery of Ag+ ions did not occur in the presence of IgG and albumins without $NaBH_4$ at different temperatures, pH, and incubation time. Broad excitation spectra of AgNC were in a range 340-540 nm. Their emission spectra correlated with the original $AgNO_3$ concentration and did not depend on protein and pH. NC stabilized with IgG or albumin with blue fluorescence and emission maximum at 420 nm contained NC from 0.6 nm and higher. Green AgNC with proteins had bright fluorescence at 430-470 nm and red NC showed emission maximum at 650 nm. TEM revealed discrete AgNC and their numerous aggregates in each sample of fluorescent NC in spite of different fluorescent emission spectra.

According to the MTT test, AgNC with human IgG and BSA with protein concentrations up to 3 mg/ml were not toxic for human larynx carcinoma HEp-2 cells despite cytotoxicity of silver nanoparticles covered with IgG or albumin envelopes as well as Cd and AuNC with BSA.

Conclusion: AgNC with antibodies and albumin with a broad size range and aggregation possess tunable fluorescence emission spectra with broad excitation at 340-540 nm. Different emission spectra permit AgNC to be used in multiplex assays. AgNC were not toxic for human tissue culture and may be applied for bioimaging.

Key Words: silver nanoclusters • fluorescent spectra • TEM •cytotoxicity

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