BIOMEDICAL APPLICATION OF FUNCTIONAL NANOPHOSPHORS FOR DIAGNOSTICS AND DRUG (GENE) DELIVERY SYSTEMS

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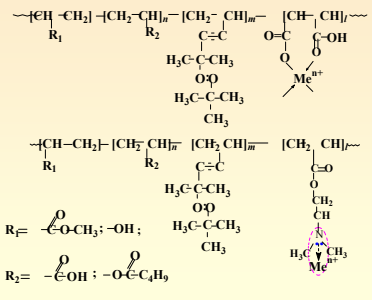
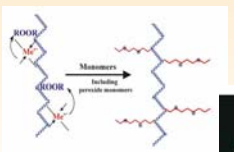
Coordinating metal complexes of transition and of rare earth metal cations

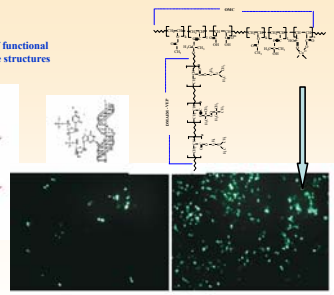


Me^{n+}= Cu^{2+}, Co^{2+}, Ni^{2+}, Cr^{3+}, Eu^{3+}, Ce^{3+}

Comb-like and branched surface-active oligoelectrolytes

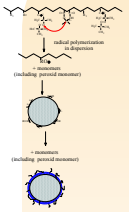
General scheme of tailored synthesis of functional oligoelectrolyte surfactants of comb-like structures





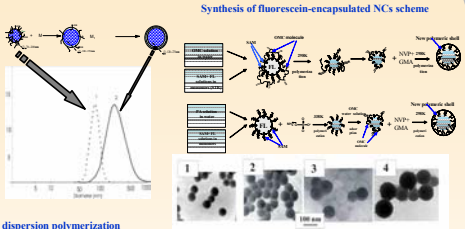
Plasmid gene transfection into tumour cell nucleus using comb-like oligoelectrolyte (b) and polyethylene imine (a) as gene carrier

Oligoperoxide modified polymeric nanoparticles as well as encapsulated and "core – shell" nanoparticles

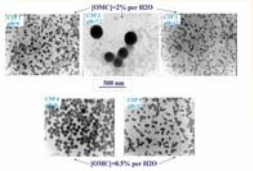


General scheme of water dispersion polymerization initiated by surface-active oligoperoxide metal complexes and polymerization seeded initiated from oligoperoxide modified nanoparticle surface

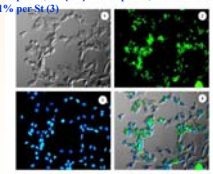
Synthesis of fluorescein-encapsulated NCs scheme



TEM images of functional polymeric NCs synthesized via water dispersion polymerization of styrene with SAM at St: SAM ratio 90:10 initiated by OMC: 1 – without fluorescein (FL), 2 – [FL] =0.1% per St, 3 – [FL] =0.5% per St, and initiated by PA, [FL] =0.1% per St (3)

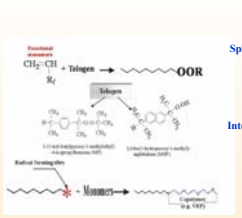


TEM images of polystyrene nanoparticles synthesized via water dispersion polymerization initiated by oligoperoxide metal complexes as initiator and surfactant

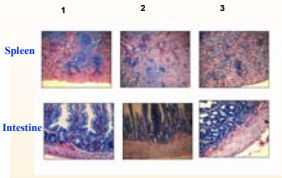


Binding fluorescein-encapsulated nanocomposites with membranes of mice line L929 transformed fibroblasts (24 h of incubation, magnification ×40). 1 – differential - interference contrast; 2 – fluorescein encapsulated nanoparticles; 3 – coloring cell cores with dye DAPI; 4 – superposed image.

Surface – active oligomers and polymers of telechelic or block structures



General scheme of the synthesis of telechelic oligoperoxides and oligoelectrolytes of block structure

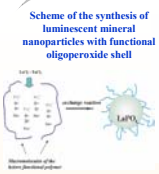


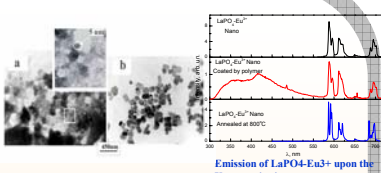
1 – control group, 2 – native antisense DNA, 3 – antisense DNA + jkigo(DMAEM-BA)-MP

Prion immunohistochemistry, 400x. Prion is red. There were developed effective antisenseDNAs and their delivery system for inhibition of cellular prion biosynthesis. Immunohistochemistry demonstrate inhibition of prion expression in the spleen of Wistar rats by almost 90% on 48th h post i. v. injection of antisense DNA – polyDMAEM complex. It is observed 80% decrease of prion content in the intestine.

Functional luminescent and super paramagnetic nanoparticles synthesized via homogeneous nucleation in the presence of oligoperoxide surfactants as template

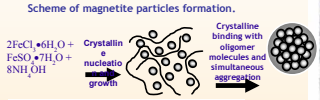
Scheme of the synthesis of luminescent mineral nanoparticles with functional oligoperoxide shell

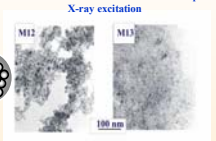




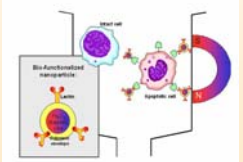
Emission of LaPO4-Eu3+ upon the X-ray excitation

Scheme of magnetite particles formation.

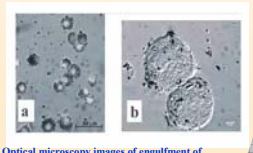




TEM images of functional magnetite nanoparticles

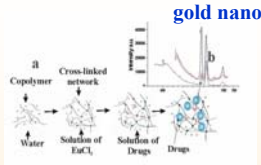


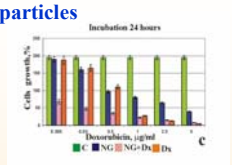
Scheme of pathological cell recognition and separation using functional magnetite nanoparticles



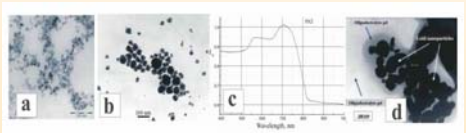
Optical microscopy images of engulfment of functional maghemite NCs (a) and of functional gold NCs (b) by mice J774.2 macrophages

Functional polymer-mineral nanoparticles and oligoelectrolyte based nanogels filled with doxorubicine and gold nanoparticles





The scheme of nanogel formation and drug immobilization (a), the luminescence spectrum of nanogel labelled at different Eu3+ content (b) and diagram of mice leukemia L1210 cell treatment (c): C – control, NG – nanogel carrier, NG + Dx – immobilized drug, Dx – free doxorubicin



TEM images of FOP-coated γ-Fe2O3 NCs (a), of gold NCs synthesized in the presence of thiol containing FOP (b); UV -VIS spectrum of gold hydrosol obtained in hydrophilic porous of cured nanogel in hexane (c); TEM image of nanogel filled with gold NCs (d).