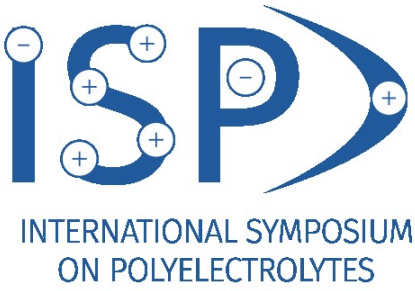
LOMONOSOV MOSCOW STATE UNIVERSITY

11-TH INTERNATIONAL SYMPOSIUM ON POLYELECTROLYTES



Abstract book

Moscow, Russia
June 27 – 30, 2016

11-TH INTERNATIONAL SYMPOSIUM ON POLYELECTROLYTES

June 27–30, 2016, Lomonosov Moscow State University

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THE FORMATION OF CHITOSAN COMPOSITES WITH METAL NANOPARTICLES IN THE BIOCOMPATIBLE SOLVENT CARBONIC ACID

Ilya V. Novikov[1], Marina A. Pigaleva[1], Marat O. Gallyamov[1]

[1] *Faculty of Physics, Lomonosov Moscow State University, Leninskie gory 1-2, GSP-1, Moscow 119991, Russian Federation*
i_novikov@polly.phys.msu.ru

It is well-known that materials based on chitosan are very promising from the viewpoint of the variety of biomedical applications (protective coatings, drug delivery, bone tissue regeneration implants, *etc*.), because of the complex of unique properties of this widely available biopolymer, such as biocompatibility, non-toxicity, antimicrobial activity.
Usually diluted acetic acid is used to dissolve chitosan, but it is known, that some residuals of this acid in chitosan-containing medical devices or materials could act as promoters of the human allergenic reaction. Therefore it will be very useful to find a biocompatible medium for chitosan dissolution.
We propose a novel approach to stabilize antimicrobial metal nanoparticles by biopolymer chitosan dissolved in the unique medium, namely carbonic acid, *i.e.* in water saturated with carbon dioxide at high pressure. Carbonic acid exhibits certain antimicrobial properties due to the action of CO_2 under high pressure. Moreover after the depressurization of CO_2 it decomposes spontaneously into gas carbon dioxide and pure water. Therefore carbonic acid is an absolute biocompatible and self-neutralizing medium, which is very promising from the viewpoint of biomedical applications.
We showed that one could obtain stable composite chitosan gels (allowing the freeze-drying with keeping their porous morphology) with metal nanoparticles in the solutions of carbonic acid. Moreover these nanoparticles can be effectively reduced by gaseous, biocompatible and also self-neutralizing reduction agent H_2, which can be simply admixed to the CO_2.

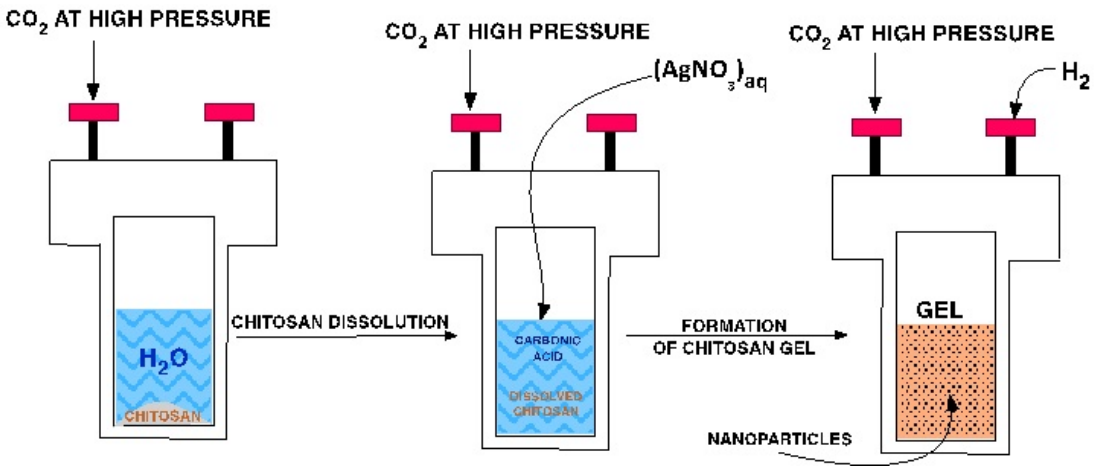

Figure 1. The experimental scheme.

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