

ANALYSIS OF NANOSTRUCTURES BASED ON CYCLODEXTRIN IRON USING SIMS

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Abstract

Nanotechnology brings new advanced materials and manufacturing processes, which are significant for the industrial production. Novel structures based on α -cyclodextrin-iron nanoparticles are presented. The behaviour depends on the way of preparation of solution. Iron nanoparticles were produced by femtosecond laser ablation of iron metal plate in an aqueous solution and in an aqueous solution of α -cyclodextrin (α -CD). The nanoparticles of cyclodextrin-iron are studied using time-of-flight secondary ion mass spectrometry. The secondary ion mass spectrometry with a detection system based on separation by time of flight is based on the bombarding of sample surface by a focused pulsed beam of primary ions based on liquid metal (Bi^+) with energy from 15 to 25 keV. Two preparation methods of supramolecular nanostructures are compared. The first method of preparation consist of laser ablation of iron plate in water solution and then this ablated solution was used for preparation of α -CD-iron supramolecular complex. The second preparation method of α -CD-iron nanoparticles consists of laser ablation of iron plate in α -CD solution. The complex 1:1 between cyclodextrin and iron is determined in cationized form with Na at 1210 m/z. The complex cyclodextrin-iron is not observed in mass spectrum of ablated α -CD solution due to the high energy regime deposition. The results obtained from this study will be used as a model for complexation of modified α -CDs with iron particles on the surface.

Keywords: Cyclodextrin, Iron Nanoparticles, Laser Ablation, SIMS

ACKNOWLEDGEMENTS

This research is sponsored by NATO's Public Diplomacy Division in the framework of "Science for Peace," project Nr. SfP984698.

Author did not supply full text of the paper/poster.