SESSION 3 *Inorganic Chemistry*

Fe_3O_4@SiO_2 Core-Shell Material with Different Ligands on Surface

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Thus, so far, magnetic nanoparticles especially Fe_3O_4 become the study focus of material scientists due to their unique physicochemical and high application potentials. Silica has more stable properties towards acidic conditions, has hydroxyl groups that enable the functionalization of Fe_3O_4 to bind diverse biological ligands. Another excellence related to the properties of SiO_2 is having a nanometre particle size with interface energy and adequate bounds to connect with the core. Besides, SiO_2 particles in nontoxic, biocompatible state, also have hydrophilic properties due to the existence of a silanol group on the surface. The combination of Fe_3O_4 and SiO_2 in the nanocomposite system has more advantages such as having biocompatibility, high biostability, and excellent response in drug delivery [1-3]. In recent work, we present Bio-On-Magnetic-Beads (BOMB) [4] synthetic route. We successfully prepare nano-Fe_3O_4 cores using precipitation reaction. In the next step of the work, we covered cores with a non-porous silica shell. The resulting core-shell material were be modified with several selected ligands with amine or mercapto groups (Figure 1). Modified core-shell materials were fully characterized using elemental analysis, Fourier-transform infrared (FTIR) spectroscopy, thermogravimetric analysis and adsorption techniques. The elemental analysis confirmed containing functional ligand on the surface of core-shell material. The thermal analysis was characterised in the range of 50 to 900 °C and confirmed the presence of different ligands on the surface of the core-shell materials. The infrared spectrum of Fe_3O_4@SiO_2 nanocomposites was characterized using FTIR spectroscopy which was run at the wavenumbers ranging between 4000-400 cm^{-1}. This analysis was used to study the organic and inorganic bonds formed in Fe_3O_4@SiO_2 nanocomposites.

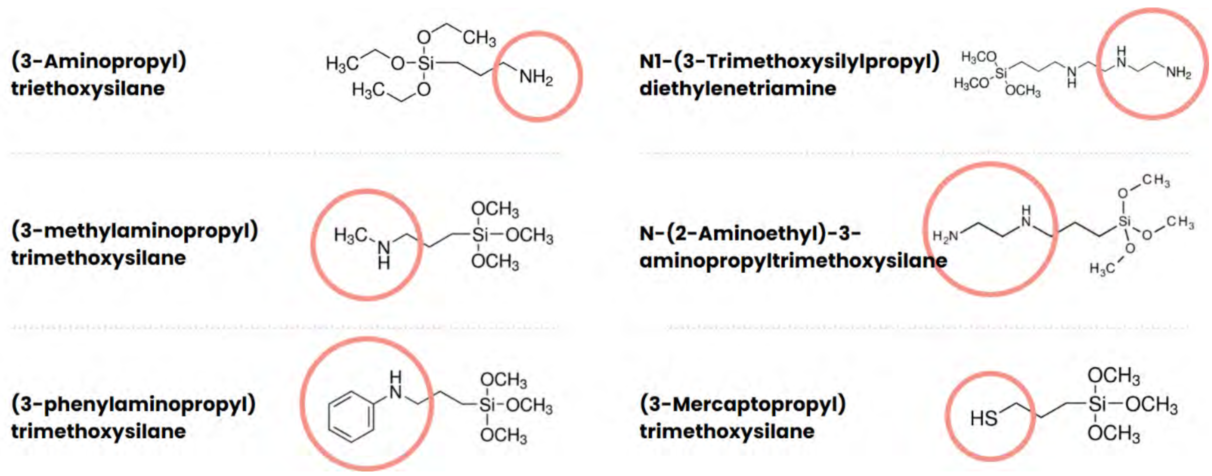

Figure 1 List of used ligands for modification

Acknowledgements
This work was supported by the projects: ITMS 2014+:313011AUW7, APVV-20-0512.

References

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