

SURFACE AND POROSITY ENGINEERING OF AMINOSILICA NANOPARTICLES FOR DIFFERENT APPLICATIONS

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Aminosilica nanospheres could be used as simple and useful carriers for different applications in nanomedicine, catalysis, adsorption, or tribology (Fig.). However they require definite characteristics, such as size, porosity, content and distribution of amino groups on the particle's surface.

Therefore, this research is devoted to one-step sol-gel synthesis of aminosilica nanoparticles. We investigated the effect of components ratio, synthesis temperature, structuring agent variations (tetraethoxysilane to bisilanes), additional methyl or phenyl groups' introduction on the particle size, functional groups concentration, porosity, zeta potential, adsorption of acid red and methylene blue dyes [1-4]. We also studied Cu²⁺ uptake and antimicrobial properties of some aminosilica particles with/without adsorbed copper(II) ions. Summarizing, such materials can have 150-460 nm size, 1.8-4.1 mmol/g of aminopropyl groups, surface area from 40 to 800 m²/g, and sorption capacities to acid red from 81 to 262 mg/g and methylene blue from 55 to 146 mg/g. Cu(II) ions adsorption was 1.2-2.6 mmol/g, forming complexes 2/1 and 1/1. Some aminosilica nanoparticles with Cu²⁺ demonstrated up to 97.8% of antibacterial activity against *S. aureus* during 60 min [4].

The suggested approaches provide control over the properties of the final materials necessary to create smart nanomaterials.

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References

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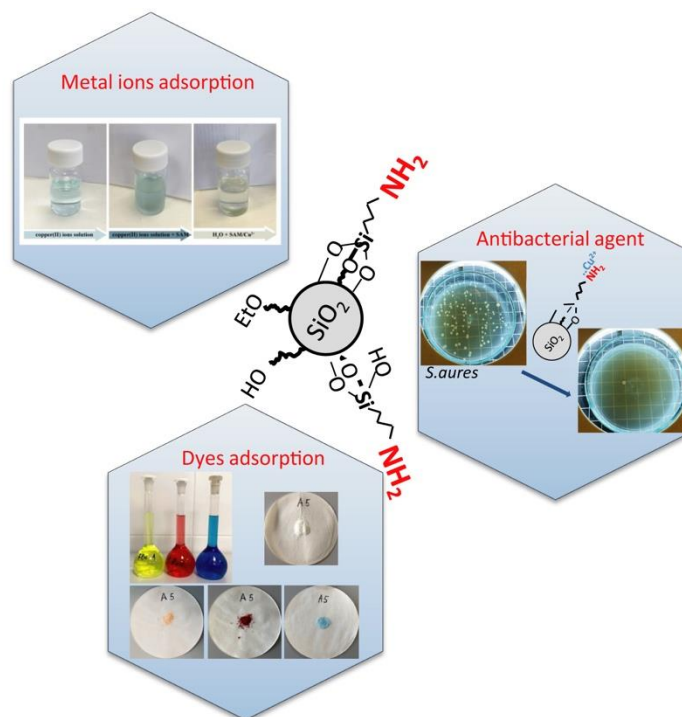


Fig. Some possibilities for application of the silica spheres with amino groups