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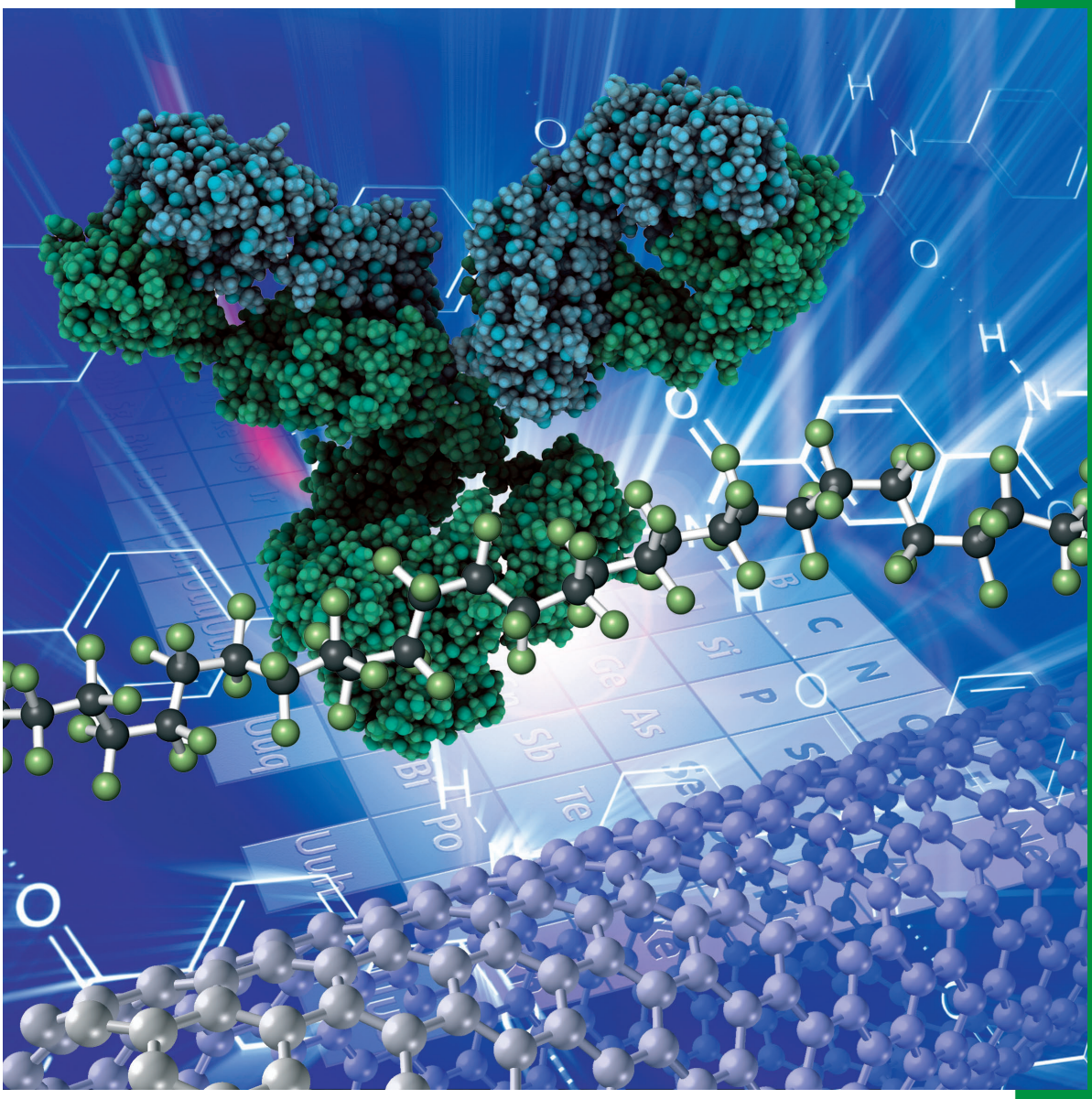

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# Solid-State Synthesis of Silver Nanoparticles and Their Catalytic Application in Methylene Blue Reduction

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The silver nanoparticles (Ag NPs) were successfully synthesized by a facile solid-state chemical method. Ag NPs were obtained by a mechanochemical reaction between silver nitrate and sodium citrate, with the constant stirring and heating of reactants. The size and morphology characterization of NPs powder was performed by scanning electron microscopy. The obtained NPs were spherical with a 36 nm average particle size diameter. UV-Vis spectroscopy, dynamic light scattering, and zeta potential measurements were used in order to characterize the surface plasmon band position in colloid dispersion and the NPs charges. Obtained NPs were utilized as a catalyst in the process of methylene blue (MB) reduction in the presence of sodium-borohydride. Kinetic measurements of uncatalyzed and catalyzed reduction were carried out using the stopped-flow technique, keeping the concentration of reactant constant. Mechanism of MB reduction in the presence of catalyst Ag NPs is elucidated as a consecutive two first-order reactions. The results of these studies support the hypothesis that NPs participated in electron transfer.

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