

Synthesis of thin colloidal crystal films and monolayer masks for metal ions implantation



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Method of seeded growth of narrowly dispersed SiO₂ microspheres of any desirable diameter (100 < D < 500 nm) has been improved and colloidal crystal films of different thickness have been grown from synthesized microspheres. The proposed method of seeded growth has a high growth rate of the microspheres at room temperature allowing doubling of their diameter every 3 hours and the standard deviation of the diameters is less than 4% for D > 200 nm. Obtained SiO₂ colloidal solutions can be directly used for growing of colloidal crystal films by vertical deposition method. Conditions for ultrathin (down to 1 close packed layer of microspheres) films growth have been established. The monolayer films have been used as masks for high dose low energy implantation of Ag⁺ or Cu⁺ ions into the glass substrates. Such process is promising for two dimensional diffraction gratings fabrication.