Solvothermal processes, as compared to hydrothermal processes, enlarge the scope of the employed solvents from aqueous to non-aqueous media, the objective being to extend the possibilities for the preparation and/or the crystal growth of non-oxide materials. During the last fifteen years solvothermal crystal growth of materials has been investigated at two different levels: (i) the macroscopic scale, with the preparation of large single crystals of functional materials for specific applications, (ii) the nanoscale, involving the elaboration of single-crystalline nanocrystallites well defined in size and morphology, and particularly adapted to nanodevices. In the first domain, two main factors have been studied: (i) the influence of the thermodynamical parameters governing the solvothermal processes, and (ii) the purity of the components (nutrient, solvent, etc.), the main objective being to reduce drastically the density of defects inside the single crystals. In the second domain, strong efforts have been made: (i) to control the nano-size, but mainly, (ii) to induce specific morphologies, in particular 1D, appropriate to the relative nanotechnologies.

Key words: Solvothermal Crystal Growth, Large Single Crystals, Density of Defects, Nanoscale Crystal Growth, 1D Nanomorphology