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Decoding and Exploiting Solid State Polymerization of Nylon Salts

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With step–growth polymers, such as polyamides and polyesters, one of the routes to high molecular weight products has been through Solid State Polymerization (SSP); accordingly the starting material is heated in an inert atmosphere at a temperature below its melting point. In our studies, the SSP of different polyamide salts was investigated, by dispersing the monomer particles in an inert non-solvent and using a glassware assembly, which provided continuous monitoring of the physical form of the reacting mass. It was found that the SSP was accompanied, depending on the reaction conditions, by a distinct transition of the process from the solid to the melt state and a generalized mechanism for the effect of polycondensation water on reaction behavior was proposed. This transition to the melt state was further exploited and a prepolymerization process, operating in the vicinity of the melting point of polyamide 6,6 salt, has been also suggested.