



INFLUENCE OF CURING CONDITIONS ON GELATION TIME AND CHEMICAL MODIFICATIONS OF CROSSLINKED POLYSILAZANES

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Polysilazane compounds based on a Si-N backbone and different possible lateral groups such as silicon hydride (Si-H), silicon methyl (Si-CH₃) or silicon vinyl (Si-CH=CH₂) are mainly used as polymer precursors for Si-N, Si-C-N or Si-O ceramic materials elaboration. The elaboration of ceramic materials from such precursors is achieved through three steps as shaping, crosslinking and pyrolysis of the polysilazane. The chemical evolution of the polysilazane structure during thermal treatment is mainly described for temperatures up to 250°C. Recently Chavez et al. studied by rheology the effect of either inert atmosphere or surrounding humidity on the poly(methyl-hydro-vinylsilazane) (PMHVS) curing rate. However, all the informations about the chemical evolution involved during thermal crosslinking are given for temperatures below 140°C. Indeed, considering the nature of the PMHVS lateral groups, different type of crosslinking reactions could occurs. Theirs reactivity were prioritized at 120°C by Yive et al. as follow: hydrosilylation > Si-H/N-H deshydrocondensation ~ transamination > polyaddition of vinyl groups ~ deshydrocoupling between Si-H. The objective of our work is thus to study and correlate the rheological behaviour and the chemical modifications of polysilazanes, such as poly(methyl-hydrosilazane) and poly(methyl-hydro-vinylsilazane), during thermal crosslinking in function of the curing conditions such as temperature, atmosphere (nitrogen or air) and catalysis. The influence of the surrounding humidity on the final structure was also evidencing through the appearance of Si-O bonds; the sensitivity of Si-H and Si-N moieties towards water was also studied.