Sintering and Crystallization of Glass Powders – Effects, Challenges and Chances

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Chemical variability is a main strength of glass. Glass powders are therefore promising candidates for manufacturing a broad diversity of sintered materials like sintered glass-ceramics, glass matrix composites or glass bonded ceramics with tailored mechanical, thermal, electrical and optical properties and complex shape. Its wide and precise adjustability makes this class of materials, even if it may not be obvious at first sight, a key component of advanced technologies. Manufacture and processing of initial powders often allow even more flexibility in materials design. At the same time, however, they can cause additional problems. The lecture illustrates possible consequences of glass powder processing upon glass crystallization and sintering as well as chances for targeted utilization. Simple kinetic models describing the effect of particle size distribution, surface crystallization and rigid inclusions on sintering as well as effects of different milling and seeding on sinter crystallization are presented.