

High-temperature reactive phase formation in refractory carbide and nitride systems: from basic investigations to applications

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Reaction diffusion is a very important phenomenon in the field of refractory carbides and nitrides for both, basic investigations as well as for tailoring materials.

In phase diagram evaluation and for studying kinetics reaction diffusion experiments supply basic data. These efforts cover phase reactions, layer growth kinetics and diffusional preparation of refractory carbides and nitrides for studying the outstanding solid-state properties of these materials.

On the other hand, the diffusional modification of the near-surface microstructure of hardmetals and cermets is an example of an industrial application of the reaction diffusion process. These materials show a favourable distribution of various hard phases and a ductile binder phase and can be applied as functional gradient materials in metal cutting operations.

The lecture summarises the efforts in the authors laboratory in the application of diffusion techniques for several transition metal carbide and nitride systems, of binary and of multi-component nature, which have been made in the last decade.