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# Design constraints and higher temperature intermetallic bond coatings

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## **DESIGN CONSTRAINTS AND HIGHER TEMPERATURE INTERMETALLIC BOND COATINGS**

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Bond coat interlayers in thermal barrier coating (TBC) systems must perform reliably in the complex thermal, chemical and mechanical environment of the turbine engine. To achieve higher temperatures and /or longer cyclic lives, a spectrum of intrinsic failure modes must be suppressed. Failure may occur at the bond coat – thermally grown oxide (TGO) interface, at the TGO-TBC interface or by oxidation-enhanced propagation of cracks from the coating into the substrate. Models for the failure processes suggest that bond coatings should possess improved high temperature strength (creep resistance), low oxide growth stresses and high interfacial toughnesses. Oxide growth stresses have been measured across a spectrum of bond coat compositions. A new femtosecond laser-based approach to measuring interfacial toughness will be discussed. Finally, the behavior of multilayered intermetallic coatings designed to be thermodynamically compatible with the superalloy substrate under cyclic oxidation conditions will be presented.