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Degradation of thermal barrier coatings by molten silicates, typically consisting of a mixture of calcia, magnesia, alumina and silica (CMAS), becomes increasingly important at higher operating temperatures of gas turbine components. One commonly recognized form of TBC degradation involves liquid phase infiltration of CMAS into porous TBC microstructure. The principal result of such infiltration is stiffening of the ceramic top coat that leads to higher compressive stresses upon cooling and eventually causes cracking and spallation of the TBC. The other, arguably less dramatic effect of CMAS deposits is due to chemical reaction between CMAS and TBC and gradual dissolution of the coating in the molten glass. Both these processes, infiltration and surface reaction, are analyzed in laboratory tests with EB-PVD 7YSZ-coated buttons and bars using two different synthetic CMAS compositions. Particularly, the infiltration kinetics is evaluated during isothermal furnace exposure at 1150^{o}C. It is demonstrated that similar TBC degradation phenomena also occur in high pressure turbine components operating in CMAS-containing environment. In addition, another form of CMAS-induced degradation of thermal barrier coatings is described. It is shown that CMAS constituents can react with the thermally grown oxide (TGO) that forms at the TBC – bond coat interface during high temperature exposure. This reaction produces a layer of $MgAl_2O_4$ on top of the TGO and results in local delamination along TBC-TGO interface. The chemical reaction between CMAS and TGO is shown to cause TBC spallation both in engine environment and lab tests. Furthermore, its effectiveness is likely to be a function of CMAS composition. Various examples of CMAS-TGO reaction during furnace and burner rig testing, as well as CMAS-affected engine hardware are shown. The relative importance of different CMAS-induced TBC degradation mechanisms is discussed.