

A Buffet Table of CMCs – An Update

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Ceramic matrix composites (CMCs) have shown considerable potential for use in a wide range of applications in sectors as diverse as aerospace, defence, energy and transport. Their significantly improved toughness compared to monolithic ceramics offers opportunities to take full advantage of the benefits offered by advanced ceramics, including low mass, high strengths and hardness, chemical inertness and high thermal resistance without having to suffer their major disadvantage of being brittle and hence susceptible to catastrophic failure. Component designers are therefore understandably keen to take full advantage of these materials. However, they often don't know exactly what they want – and there are several different types of CMC, including those based on oxide, silicon carbide and carbon fibres with a diverse range of different ceramic matrices. The question, therefore, is how does the materials scientist and engineer deliver what the designer needs? In our work at the University of Birmingham, we are designing and developing new ceramic-based composites that offer a wide range of tuneable properties; effectively creating a 'buffet table' of ceramic composite materials. This presentation will outline the current situation and will cover ox-ox, SiC-SiC and UHTCMCs, not just in terms of their composition and structure but also with respect to component shape.