

MSE-401

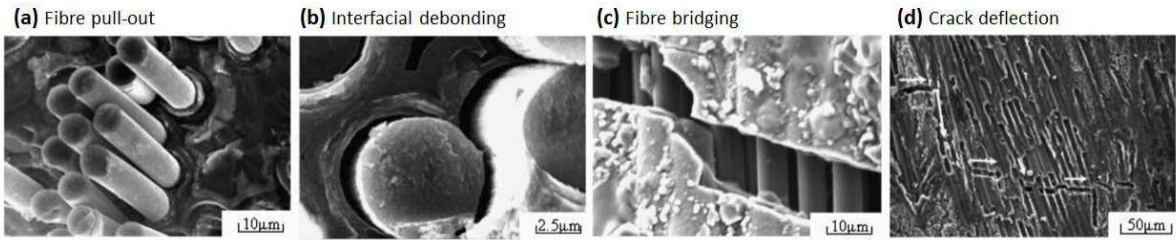
CMCs

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Ceramic Matrix Composites

- ✚ Ceramic matrix composites have matrices of alumina, calcium alumino-silicate etc.
- ✚ Combination of ionic and covalent bonding between metallic and nonmetallic elements makes it strong candidate.
- ✚ High stiffness, chemical inertness, low density, thermal stability, good insulating, etc.
- ✚ Operation over a wide range of temperatures.
- ✚ Lack of toughness and high brittleness leads to catastrophic failure at low strains (<1%)

**** Fiber reinforcements can be used to improve the toughness of a material.



S. Fan, et al., Compos. Sci. Technol. 67, 2390 (2007).

Problems in CMCs

Limitations and Future Challenges :

- ✚ CMCs offer a unique package of properties, specially at high temperatures
- ✚ Advancement in manufacturing techniques like LSI process etc., has made CMCs accessible in areas especially in automotive sectors.
- ✚ The high costs of processing is the main issue for application in more cost-effective areas.
- ✚ Development of new technology for lowering the processing temperatures
- ✚ Automation problems