FIRE RESISTANT BISPHENOL-C POLYMERS

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High temperature polymers are intrinsically fire resistant because they can withstand the heat from a fire without thermally degrading to volatile, combustible fuel. Bisphenol-C polymers are not particularly heat resistant, but exhibit fire performance which is comparable, or superior, to high temperature polymers because of a novel molecular rearrangement of the polymer backbone which occurs in a fire (i.e., *in situ*) to produce noncombustible gases and char in quantitative yield. Bisphenol-C polymers are low-cost, flexible polymers that process at moderate temperatures and are derived from the novel bisphenol 1,1-dichloro-2,2-bis(4-hydroxyphenyl)ethylene (BPC). Thermoset polymers derived from BPC which have been synthesized and tested to date by the FAA include epoxy, cyanate ester, epoxy/cyanate ester blends and their composites. Thermoplastic BPC polymers include polycarbonate and polyarylates. Bisphenol-C polymers have mechanical and thermal properties equivalent to bisphenol-A analogs, but they are ignition resistant and have extremely low heat release rate in forced flaming combustion. For example, all of the BPC thermosets and thermoplastics pass the FAA flaming heat release requirement for aircraft interiors FAR 25.853(a-1). The BPC-cyanate ester tested as a glass fabric laminate passed all of the fire performance acceptance criteria for structural composites used on U.S. NAVY submarines (MIL-STD-2031). The synthesis and properties of BPC polymers will be presented as well as the proposed mechanism for their fire resistance.