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Microstructure, properties and formation mechanism of SiO_2/SiC nano-coating onto carbon fiber by non-electrode plasma electrolysis

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Abstract: Recently we have developed a novel non-electrode plasma electrolysis technique in order to rapidly prepare SiO_2/SiC nano-coating onto carbon fiber. The surface and cross-sectional microstructures of the SiO_2/SiC nano-coating were systematically investigated. The nano-coating was dense and roughly uniform, mainly composed of amorphous SiO_2, where a small amount of SiC was distributed. A superior bonding was observed between the nano-coating and the fiber substrate. The cross-sectional TEM revealed ~80 nm in the thickness for the coating. The SiO_2/SiC nano-coating significantly reduced the oxidation rate with the burn-out temperature increasing from 880^{o}C to 1250^{o}C. It was proposed that the heat evolution, mechanical effect and plasma chemical reactions had a critical effect on the formation of the

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