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Synthesis of ZrC coatings in a vertical-wall CVD system

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Abstract content ** ** (Max 300 words) **Formatting & Special chars**

Polycrystalline ZrC coatings were grown on graphite substrates by chemical vapour deposition technique. Zirconium Tetrachloride (ZrCl_4) powder and methane (CH_4) gas were used as zirconium metal source and carbon source respectively. Argon and hydrogen were used as carrier and dilutant gas respectively. ZrC thin films were deposited at substrate temperatures ranging from 1200 oC to 1600 oC for two hour at atmospheric pressure. The impact of substrate temperature on surface morphology and microstructure of ZrC coatings were examined using X-ray diffraction (XRD) and Scanning electron microscopy (SEM). The variations in crystallite size, dislocation density, texture coefficient, lattice constant and degree of preferred orientations of ZrC films with substrate temperature were established. At lower temperatures of about 1200 oC, the plane (111) had the preferred orientation and as temperature increased to about 1500 oC the preferred orientation shifted to plane (200). The surface morphology and microstructure of ZrC thin films at various substrate temperature were observed using SEM. The SEM results indicated that as the temperature increased from 1400 oC to 1600 oC the uniformity of the surface morphology of ZrC coatings improved.

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