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# Early stages of pyrolytic carbon deposition on planar substrates in a hot-wall reactor

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To improve the understanding of the texture formation during chemical vapour infiltration of carbon fibre structures a simplified experimental set-up was chosen for this study. Pyrolytic carbon layers were deposited on planar substrates (silicon wafers) instead of using carbon fibre preforms. The depositions were performed in a hot-wall reactor with the substrate oriented parallel to the gas flow. Methane / oxygen / argon mixtures were used at a total pressure of 100 kPa, residence times up to 2 s and a temperature of 1100°C. Short deposition times between 1 and 4 hours were chosen to focus on the early stages of the deposition process. Scanning and transmission electron microscopy were applied to study the thickness profiles and the texture of the carbon layers on a micrometer and nanometer scale. The surface topography was investigated by atomic force microscopy. For pyrolytic carbon deposited without oxygen, an alteration from medium- to high-textured carbon is observed with increasing residence times. Islands are observed on the surface of the layer whose size increases with the texture. For pyrolytic carbon deposited with 3 % oxygen, lower deposition rates were obtained and a strong modification of the texture is found compared to gas mixtures without oxygen.