Numerical model for simulation of HFCVD process, used for diamond growth

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Hot-filament chemical vapor deposition (HFCVD) is a common method employed for diamond deposition. Typically in this method a dilute mixture of carbon containing gas such as methane in hydrogen is thermally activated at sub atmospheric pressures by a hot filament. Due to the filament-substrate proximity, large temperature variation across the substrate is possible. In this work we investigate the role of fluid flow and heat transfer from the filament to substrate in determining the quality of diamond growth. The commercial software CFX was used to calculate velocity field, temperature distribution and fluid flow. A vortex was identified on the substrate and may disperse the precursors that are important in the diamond formation. It is not of our knowledge that CFX has been used to simulate heat flow in a complex geometry like HFCVD.