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Experimental Study of the Flow in a Rotating CVD Reactor SUN WONG, JIANDONG MENG, YOGESH JALURIA, Rutgers University — An experimental model is developed to study the rotating, vertical, impinging chemical vapor deposition reactor. Deposition occurs only when the system has enough thermal energy. Therefore, understanding the fluid flow and thermal characteristics of the system would provide a good basis to model the thin film deposition process. The growth rate and the uniformity of the film are the two most important factors in the CVD process and these depend strongly on the flow and the thermal transport within the system. Operating parameters, such as inflow velocity, susceptor temperature and rotational speed, are used to create different design simulations. Fluid velocities and temperature distributions are recorded to obtain the effects of different operating parameters. Velocities are recorded by using a rotameter and a hot wire anemometer. The temperatures are recorded by using thermocouples and an infrared thermometer. The effects of buoyancy and rotation are examined. The expermental study is also coupled with a numerical study for validation of the numerical model and to expand the domain. Comparisons between the two models are presented, indicating fair agreement. The numerical model also includes simulation of Gallium Nitride (GaN) thin film deposition. This simulation thus includes mass transport and gas kinetics, along with the flow and heat transfer within the system. A three dimensional simulation is needed due to the rotation of the susceptor. The results obtained as well as the underlying fluid flow phenomena are discussed.

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