Modeling and optimization of operating condition for polysilicon CVD reactor which belong to Siemens process

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Generally, one of the most popular polysilicon production method is Siemens process using CVD reactor. This is process that due to resistance heat following from electricity flowing through seed silicon rod, TCS (Trichlorosilane) which is precursor is deposited on surface of silicon rod and it becomes thicker. This is polysilicon rod which is raw materials of semiconductor and solar panel. Not only rapid gradient of temperature, concentration and velocity of gases near the rod but also related some surface and gas reaction are too knottily coupled that despite of extensive employing on the industry, it have rarely studied for the model.

In this study, Model, is reflected both temperature, velocity and component balance equation and investigated surface and gas phase reaction, are established. Then, Matlab code is written using finite difference methods to simulation the model. Finally, to find operation condition where it reaches the best performance of reactor, optimization is carried out.