

EXPERIMENTAL AND THEORETICAL STUDIES OF THE PLASMA
POLYMERIZATION OF ETHANE

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ABSTRACT

Ethane was plasma polymerized in an r.f. (13.56 MHz) discharge sustained between two parallel plate electrodes. The rate of polymer deposition as a function of axial position in the discharge was determined using a moveable quartz crystal mass monitor. The composition of the gas effluent from the reactor was monitored by gas chromatography. Deposition rates and gas composition were monitored as a function of gas pressure, monomer flow rate, and discharge power. A detailed model of the polymerization kinetics was used to interpret the experimental data. It was established that if the rate parameters entering the model were adjusted to fit the deposition profiles for a given power, pressure, and flow rate, that the model then accurately described the dependence of deposition rate and gas composition on flow rate. It was further established that the parameters required to obtain a fit between theory and experiments are physically reasonable and change in magnitude with changes in polymerization conditions as would be expected.