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A study of SiC:P selective epitaxial growth by uniform experimental design

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Abstract. Using a full-fraction uniform experimental design, the sensitivity of low-temperature (550–650C) SiC:P selective epitaxial growth to changes in the factors and their second-order interactions were quantified. Five factors (Si_2H_6, CH_3SiH_3, PH_3, pressure and temperature) at three levels were studied. The responses are SiC:P growth rate and C, P concentration, which were determined using high-resolution X-ray diffraction and secondary ion mass spectroscopy (SIMS). The effects of the main factors and their second-order interactions on the responses were calculated using JMP Statistical Discovery Software. Pareto plots were used to rank these effects. Prediction traces and interaction plots were also used to provide additional information on the importance of the main factors and their interaction effects, respectively. The results indicate temperature is very critical to ensure stable SiC:P growth rates and C content.

Keywords: SiC:P, epitaxial growth ,uniform experimental design