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Analysis of the environmental ramifications of an SF_6/O_2 etch using simulation JAMES MUNRO, Quantemol, JONATHAN TENNYSON, STEPHEN HARRISON, University College London, DANIEL BROWN, Quantemol — Sulfur Hexafluoride (SF_6) is a processing gas that is used industry-wide in a range of processes for the dry etching of silicon. However, the performance and efficiency of different processes and machines can vary widely. Through simulation we can gain significant insight into the optimization problem and provide a low cost means for further development. SF_6 is very bad for the environment with a Greenhouse Warming Potential that is 22,000 times that of CO_2. Therefore it is vital that SF_6 is used sparingly and efficiently in every process. Simulation can help to find ways of remediating harmful waste gases and optimize the process for typical processing goals (e.g. etch rate, uniformity) as well as improving SF_6 consumption efficiency and other environmental measures. Here we present an full chamber 2D simulation of an SF_6/O_2 silicon etch process, building upon previous calculations of SF_6 plasma chemistries using Quantemol-P (J.J. Munro and J. Tennyson, J. Vacuum Sci. Tech. A, 26, 865). Etch rate, pressure and power trends along with chamber wide contour plots of gas-phase species concentrations and fundamental plasma properties are considered.

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