# *High-Aspect-Ratio Freestanding Si Nanograting for Solar Wind Plasma Measurements*

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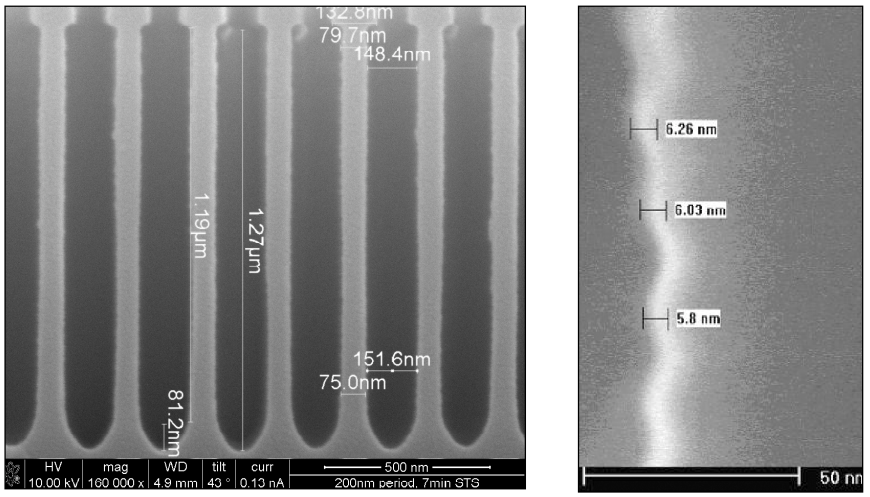


*Side-view SEM of DRIE silicon grating (left) and magnified view of sidewall scalloping (right).*

To measure space plasmas and neutral particles, one must filter out high-energy ultraviolet photons that would increase background count or damage sensors. To enable sensitive neutral particle measurements, a photon-to-particle rejection rate of $10^{14}$ is desired, far exceeding the requirements of prior filters. In this project, a high-aspect-ratio Si grating with densely packed, sub-100nm slits are created as a freestanding structure. A technique involving nanoimprint lithography and a new, deep reactive, ion etching has resulted in grating slits with scalloping under 7nm and high (8.5:1) aspect ratios. Silicon-on-insulator wafers will be used to create these gratings on freestanding diaphragms, and techniques for freeing the gratings without damaging them are currently being explored. P. Mukherjee and T. Zurbuchen are with the Solar-heliospheric Research Group in Aerospace Engineering. This project is supported by the National Aeronautics and Space Administration under contract number NNG04GL44H.