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Numerical and analytic results showing the suppression of secondary electron emission from velvet and foam, and a geometric view factor model to guide the development of a surface to suppress SEE.[1]
CHARLES SWANSON, I. D. KAGANOVICH, Princeton Plasma Physics Laboratory — The technique of suppressing secondary electron emission (SEE) from a surface by texturing it is developing rapidly in recent years. We have specific and general results in support of this technique: We have performed numerical and analytic calculations for determining the effective secondary electron yield (SEY) from velvet, which is an array of long cylinders on the micro-scale, and found velvet to be suitable for suppressing SEY from a normally incident primary distribution. We have performed numerical and analytic calculations also for metallic foams, which are an isotropic lattice of fibers on the micro-scale, and found foams to be suitable for suppressing SEY from an isotropic primary distribution. More generally, we have created a geometric weighted view factor model for determining the SEY suppression of a given surface geometry, which has optimization of SEY as a natural application. The optimal surface for suppressing SEY does not have finite area and has no smallest feature size, making it fractal in nature. This model gives simple criteria for a physical, non-fractal surface to suppress SEY. We found families of optimal surfaces to suppress SEY given a finite surface area.

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