

## Analytical Radiative Emission Results for Argon/Copper Thermal Plasmas

J. Menart, E. Pfender, and J. Heberlein

Department of Mechanical Engineering and  
ERC for Plasma Aided Manufacturing  
University of Minnesota, Minneapolis, MN 55455

### ABSTRACT

Analytically determined thermal radiative properties for argon and argon/copper plasmas at one atmosphere, in the temperature range from 3000 to 25000 K, are presented. The thermal spectrum from 0.3 to 25  $\mu\text{m}$  is covered. The spectral emission coefficient, integrated emission coefficient, and net emission coefficient are the properties considered. To determine the limits of the optically thin regime, the intensity for a line-of-sight in a isothermal, homogeneous plasma versus path length is compared to the intensity calculated with the optically thin assumption. To obtain information on the dominating emission mechanisms, the fractional contributions of the bound-bound, free-bound, and free-free emission are shown. To obtain information on the dominating species, plots of the fractional contributions of each of the individual atoms and ions is presented. Because it is of interest to know how much of the total radiation is in the vacuum ultraviolet, fractional plots of this are presented too.