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NASA TECH BRIEF

Properties of Optics at High Temperatures and Their Measurement, a Study

A bibliography has been prepared to list the sources containing emissivity and absorptivity data on materials at extremely high temperatures. Experimental work to determine data in these listings was done using both the absolute and comparative methods for obtaining values. In the absolute method the values were calculated by knowing the power input and losses and the resulting surface temperature of the sample. In the comparative method the values were obtained by a comparison of sample and blackbody radiation at the same temperature. Data available from these two methods are limited and are also inconsistent in value from one laboratory to another. Terminology in the various sources is not consistent, but definition conflicts are being resolved. One very difficult problem in comparing results in these sources is to recognize the possible error in measurements made at high temperatures, especially errors in determining temperatures of samples above 1500° K. The sample temperature and degree of specularity must be known, but present values are neither accurate nor reliable when experiments are duplicated. Accurate data for emission and absorption in the optical wavelength band of the spectrum for materials at high temperatures are necessary in heat transfer analyses and radiometric instrumentation in satellites. Emphasis in this bibliography was placed on listings giving information about the instrumentation used in the experimental work. Thus, the experimental techniques, equipment, and efforts of the experimenters to characterize the materials used and methods to evaluate the errors are given in the sources in this bibliography.

Note:

Inquiries concerning this bibliography may be directed to:

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Reference: B68-10240

Patent status:

No patent action is contemplated by NASA.

Source: D. W. Gates
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Category 02