Abstracts

Graphite Millimeter-Wave Waveguide and Mirror for High Temperature Environments

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A graphite helix corrugated waveguide with a miter mirror has been fabricated and used for 135 GHz pyrometer measurements on a high temperature plasma arc furnace. The guide has an internal diameter of 3.81 cm, a length of 123 cm, and a corrugation of 32 grooves/inch. One end of the guide was sealed with a Teflon window having moth eye surfaces to reduce reflections. The room temperature insertion loss of this guide assembly for HE/sub 11/ mode propagation and launch was measured to be 0.5 ± 0.1 dB. It was used successfully in a high temperature environment where the miter mirror end reached incandescent temperatures in access of 1200° C. High temperature graphite surface corrosion typically increased the insertion loss to 1.2 ± 0.2 dB but did not significantly affect the beam divergence.

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