

Supporting Information for

Dynamic thermal emission control based on ultrathin plasmonic metamaterials

including phase-changing material GST

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The Supporting Information includes the following contents:

I. Infrared property of amorphous and crystalline GST

II. Contributions of thermal emission in different layers at different crystallization fraction

I. Infrared property of amorphous and crystalline GST

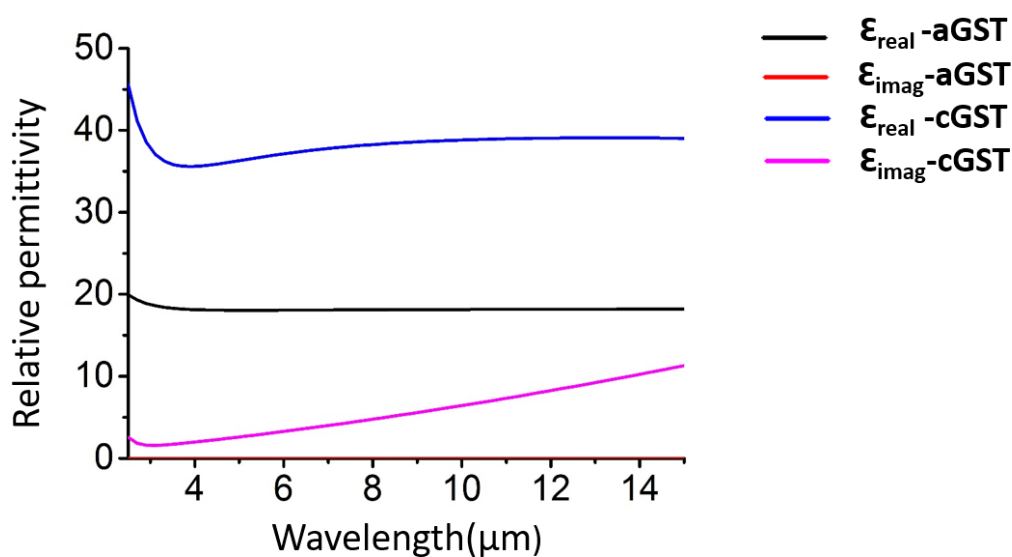


Figure S1. The relative permittivity of aGST and cGST derived from the transmission and reflection spectra.

The relative permittivity of GST (2.5-15 μm) are obtained experimentally from the fabricated GST films (Fig. S1), and the permittivities used in simulation (2.5-25 μm) are obtained by fitting experimental permittivities based on multi-coefficient models (MCMs) in FDTD Solutions.

II. Contributions of thermal emission in different layers at different crystallization fraction

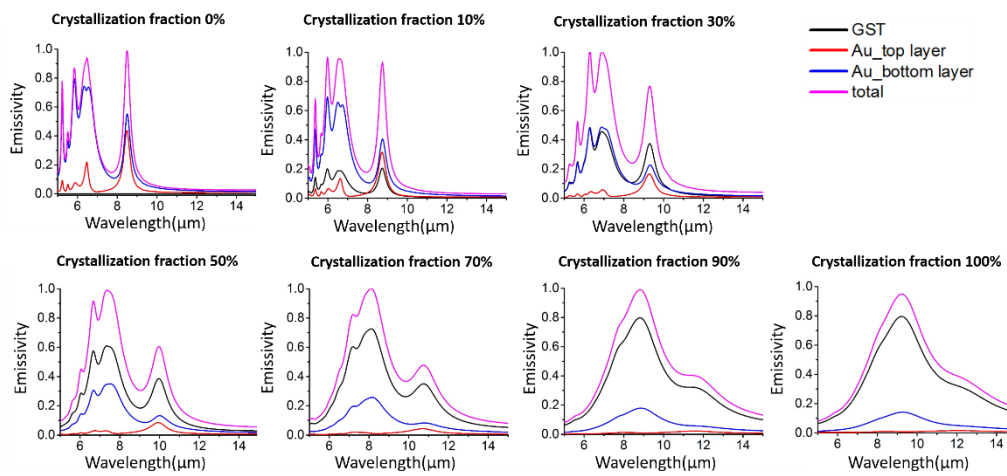


Figure S2. Simulated emissivities of the MIM thermal emitter at different crystallization fraction from 0% to 100%. Black, red, blue and pink curves represent contributions of thermal emission in GST layer, gold top layer, gold bottom layer and total thermal emission, respectively.

The contributions of thermal emission in the GST film, the top metallic disk and the bottom metallic film are calculated at the different crystallization fraction from 0% to 100%. The contribution of the GST film in the total thermal emission increases by changing the crystallization fraction of GST from 0% to 100%, because GST film gets more lossy with the increasing imaginary part of cGST permittivity. The loss of the gold bottom layer is always larger than that of the top layer, and is nearly the same as the GST film at crystallization fraction of 30%.