Supplemental material to Spatial and spectral distributions of thermal radiation emitted by a semi-infinite body and absorbed by a flat film

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I. SUPPLEMENTAL MATERIAL 1

A. S-wave contribution to the spectral and directionnal distributions of the radiative heat flux

In Fig. S1, we plot of the s-polarized transmission coefficient in the case of a constant dielectric function $(20 + 0.01i)$, for a film thickness of 10 µm and a vacuum gap of 10 µm, for the purpose of comparing with the p-polarized component in the main text. The observed features are qualitatively similar to those observed in Fig. 3.

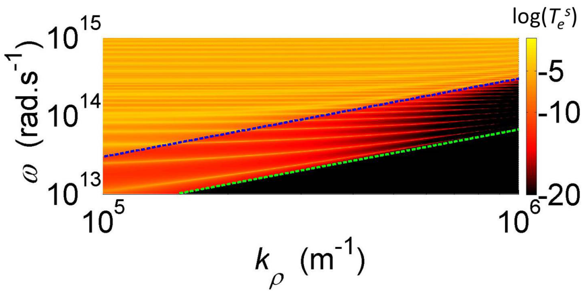

Fig. S1. s-polarized component of the transmission coefficient T_e^s for a constant dielectric function, as a function of k_ρ and ω, $d = 10$ µm and $t = 100$ nm. The blue dashed line represents the curve of equation $\omega = k_\rho c$ and the green dashed line represents the curve of equation $\omega = \frac{k_\rho c}{n}$

B. Interferences in the case of silicon carbide

Fig. S2 shows a plot of the p-polarized transmission coefficient (T_e^p) in the case of SiC, for a film thickness of 10 µm and a vacuum gap of 10 µm. Frustrated modes are located between the blue line and the green line, outside the reststrahlen band. Resonances due to interferences inside the film can be observed in this region. The discussion of Fig. 3 in the main text applies to real materials

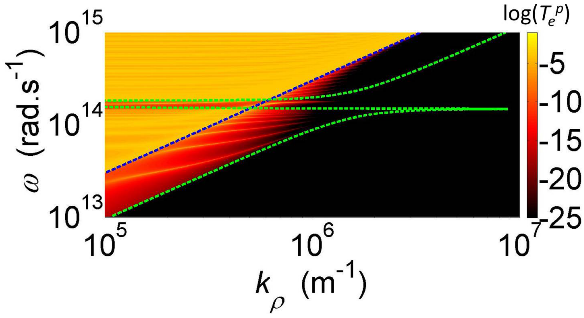

Fig. S2. p-polarized component of the transmission coefficient T_e^p for SiC, as a function of k_ρ and ω for the case of SiC, $d = 10$ µm and $t = 100$ nm. The blue dashed line represents the curve of equation $\omega = k_\rho c$ and the green dashed line represents the curve of equation $\omega = \frac{k_\rho c}{n}$

C. Effects of interferences on the spatial and spectral distributions of absorbed radiative power

Fig. S3 depicts the spatial and spectral distribution of the absorbed radiative power in the case of a constant dielectric function $(20 + 0.01i)$, for a film thickness of 10 µm and a vacuum gap size of 10 µm. Interferences occur in the cavity and inside the film. Effects of interferences in the film are clearly highlighted.

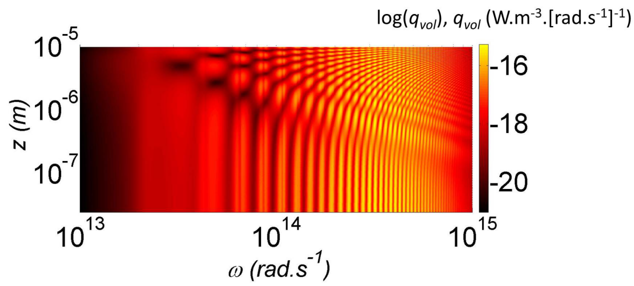

Fig. S3. Radiative power absorbed per unit volume as a function of depth z and angular frequency ω for $d = 10$ µm and $t = 100$ nm

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II. SUPPLEMENTAL MATERIAL 2: AN ANALYSIS OF THE PARTICIPATING MODES AS A FUNCTION OF DEPTH IN THE LAYER

Fig. S4. is an animation that represents the spectral and directional distributions of the absorbed power as a function of depth in the film, for d = 100 nm. It can be observed that absorption at the top surface of the film is due to the hybridized modes in the vacuum gap, while absorption at the rear interface is due to the single-interface mode.

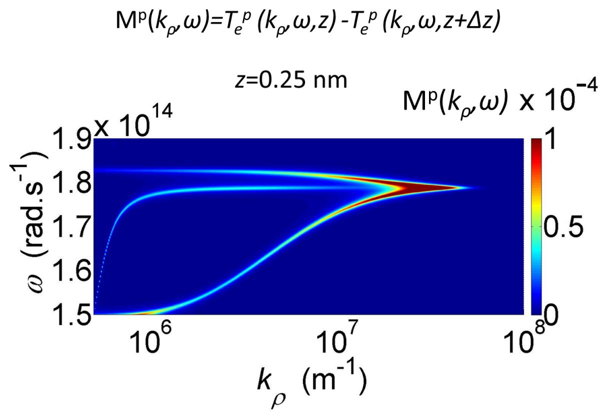

Fig. S4. The term $M^p(k_\rho, \omega)$ is the difference of the p-polarized transmission coefficients at the boundaries of a control volume, and thus represents the modes that participate to absorption in this control volume z