Electronic Supplementary Information

Zigzag-Type Meta-Structures of Metallic Glass with Precisely Tunable Emissivity for Thermal Infrared Camouflage Technology

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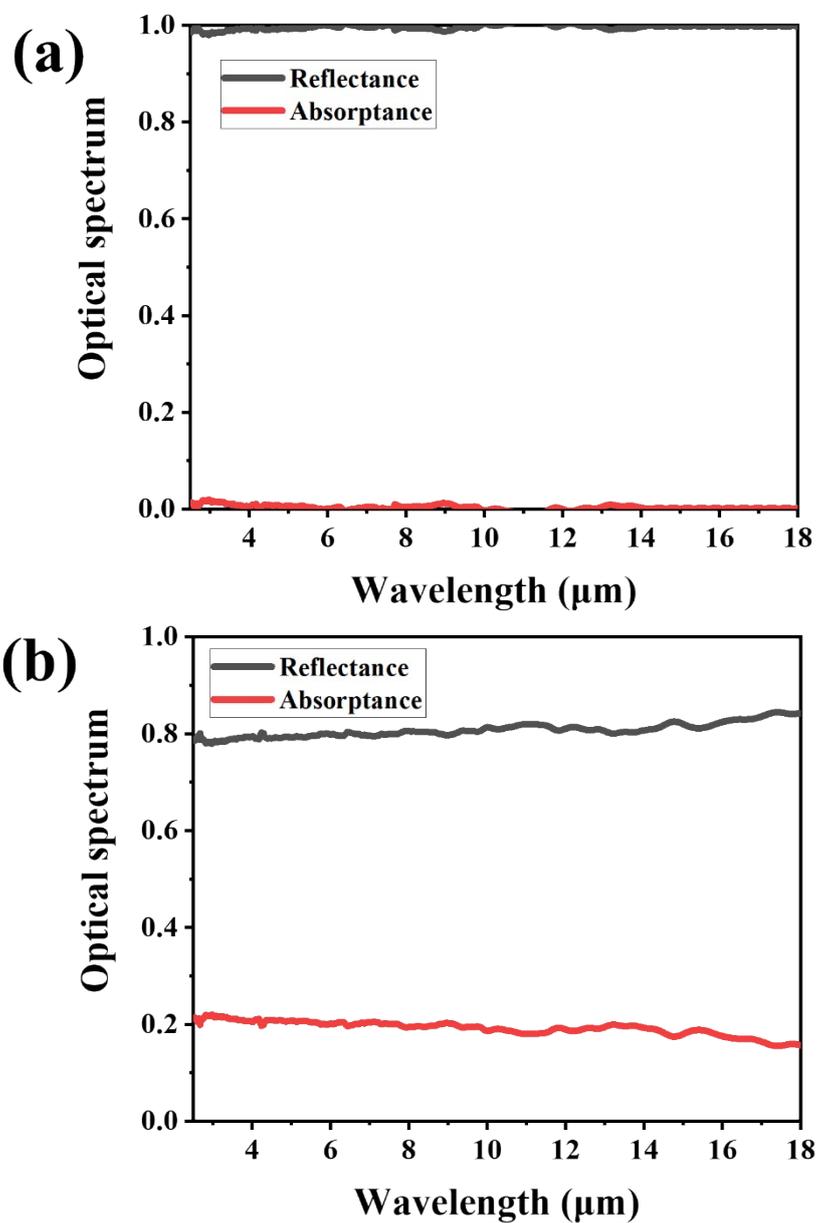
Figure S1

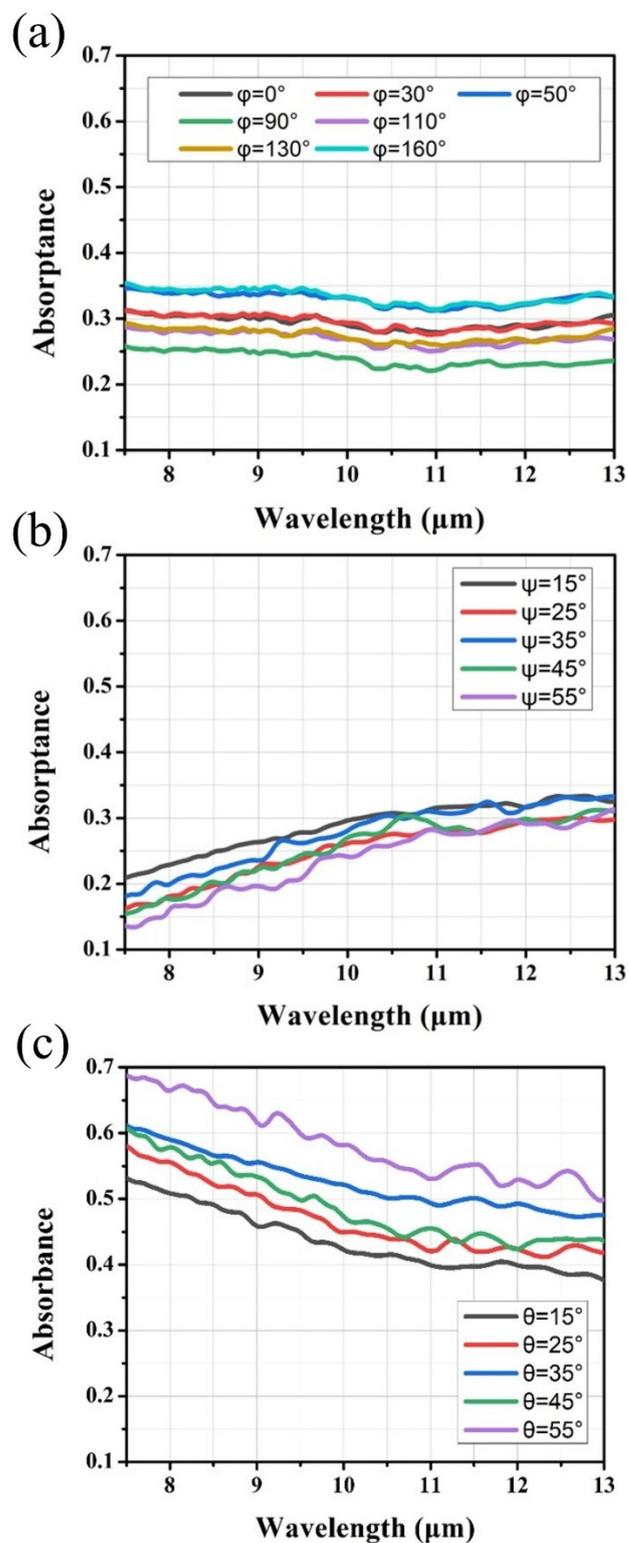**Figure S1** The optical spectrum of (a) Au (b) FeCrCoMoCBSi metallic glass from 2.5 μm to

18 μm.

Figure S2

Figure S2 Infrared absorptance spectra measured under different angular settings. (a) φ-scan,

θ=0°,ψ=15°. (b). ψ-scan, θ=0°, φ=90°. (c) θ-scan, ψ=0°, φ=140°.
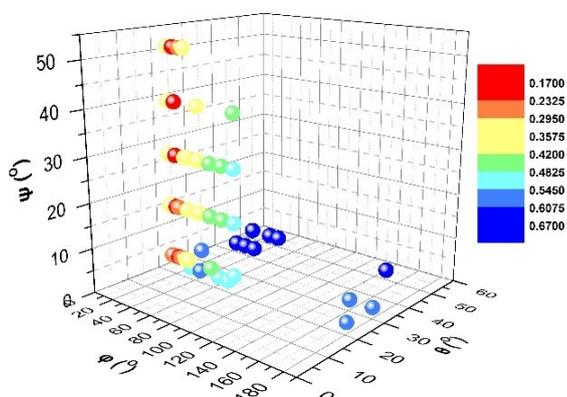
Figure S3

Figure S3 The 3D scatter plot showing different (φ, θ, ψ) conditions and the corresponding emissivity.

Supporting Information S4

Supporting Information S4 Calculation of the apparent temperature similarity in the thermal camouflage demonstration

To determine the apparent temperature similarity between the target and background, one method is to calculate the Euclidean distance between points in a thermal infrared image. In this study, the red, green, and blue (RGB) color spaces were used, with each color value ranging from 0 to 255. For two specified points in thermal infrared images, their colors in the RGB color space are denoted as (R_1, G_1, B_1) and (R_2, G_2, B_2). The similarity between these two points can be obtained using the following equation:

$$Similarity(\%) = \left(1 - \frac{\sqrt{\left(\frac{R_1 - R_2}{255}\right)^2 + \left(\frac{G_1 - G_2}{255}\right)^2 + \left(\frac{B_1 - B_2}{255}\right)^2}}{3}\right) \times 100\%$$

Supporting Information S5

Supporting Information S5 Comparison of the in-plane anisotropic absorptance modulation between the zigzag structure and a tilted pillar structure.

To directly compare the emissivity performance, the tilted pillar structure was fabricated under identical process conditions as the zigzag structure, including the deposition power, working pressure, gas flow rate, and deposition duration. As shown in the following **Figure S4**, the in-plane absorptance of the tilted pillar structure is lower than that of the zigzag structure, and the zigzag structure shows a wider emissivity range. In glancing angle deposition, the deposited morphology is primarily governed by the shadowing effect, which is inherently anisotropic and acts mainly parallel to the deposition plane. As the deposition proceeds, columns tend to broaden into fan-like shapes, resulting in an increase in column diameter and a reduction in inter-column spacing. With further growth, this broadening can promote top-bridging.
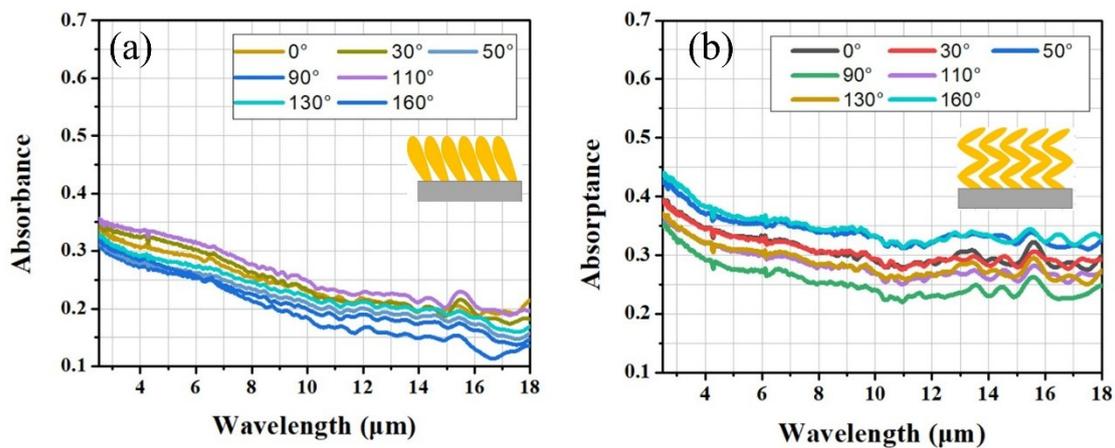
Figure S4 The infrared absorptance spectra for varying φ for (a) the tilted pillar structure and

(b) the zigzag structure, with θ and ψ fixed at 0° and 15°, respectively. Insets show the

corresponding cross-section illustrations.