Electronic Supplementary Material (ESI) for Physical Chemistry Chemical Physics.

Supplementary material

Modeling of the synergistic anti-reflection effect in gradient refractive index films integrated with subwavelength structures for photothermal conversion

Yixuan Wang[1], Jingxu Shi[1], Xiangjun Liu[1], Bing Chen[1*], Xiangfu Wang[1,2*]

[1]*College of Electronic and Optical Engineering & College of Flexible Electronics (Future Technology), Nanjing University of Posts and Telecommunications, Nanjing, 210023, China*

[2]*The State Key Laboratory of Refractories and Metallurgy (Wuhan University of Science and Technology), Wuhan, 430081, China*

*Corresponding authors

E-mail address: bchen@njupt.edu.cn (B. C.); xfwang@njupt.edu.cn (X. W.).

The three-layer structure of GRITCs based on PU/MCS (surface refractive index n_s = 2.35)[1] with the optimized SNA is designed.

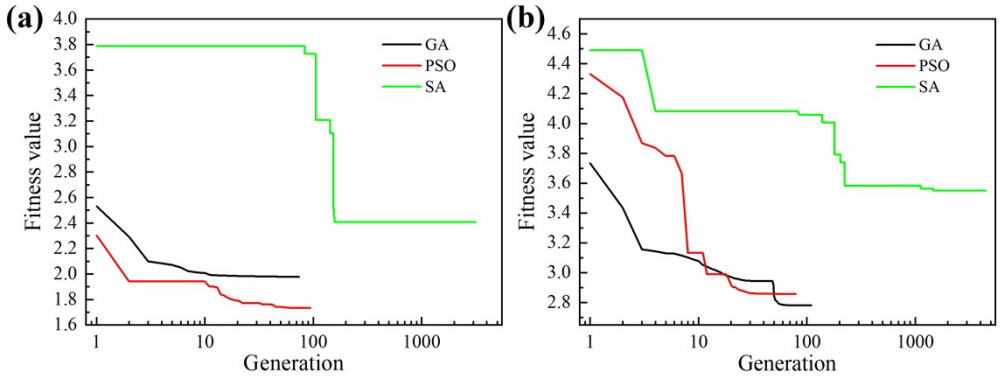

Fig. S1 (PU/MCS as substrate) The convergence curves of GA, PSO, and SA with (a) R_{ave} or (b) $R_{w\text{-}ave}$ as the fitness function.

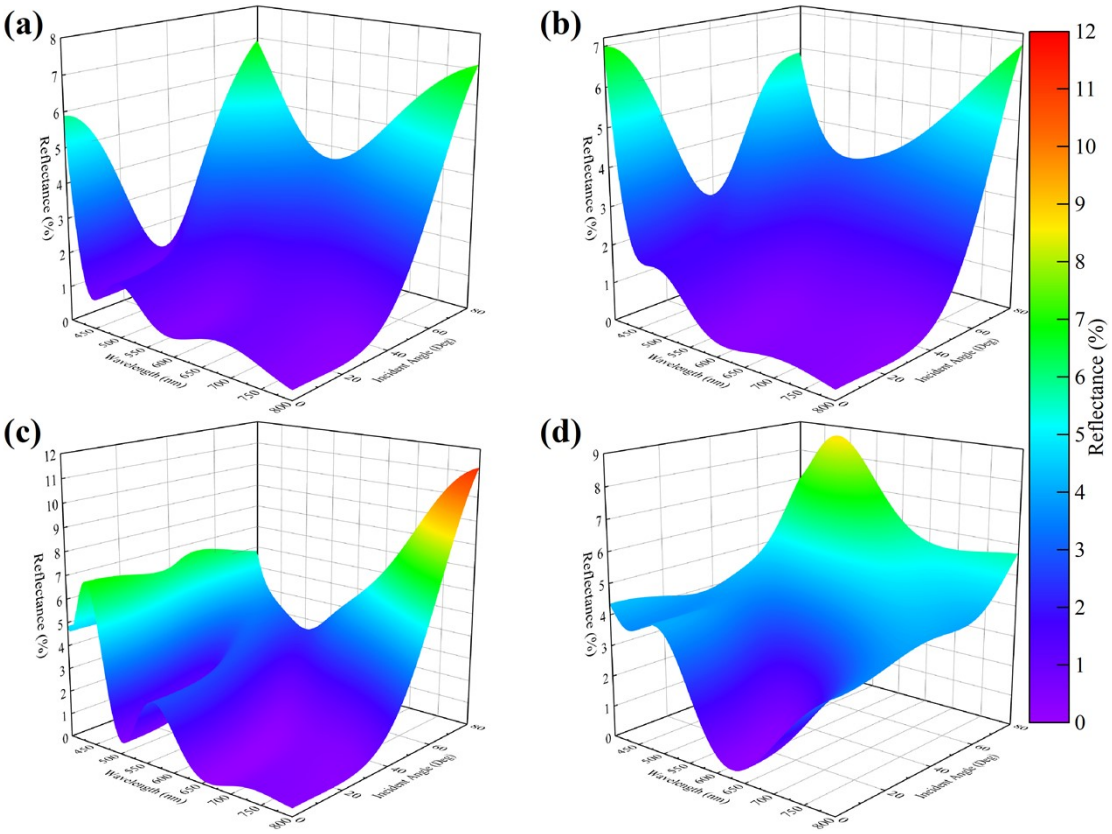

Fig. S2 (PU/MCS as substrate) Reflectance characteristics of the structures individually optimized by (a) GA, (b) PSO, (c) SA, and (d) QID, with R_{ave} as the objective function, for wavelengths from 400 to 800 nm and incident angles from 0° to 80°.

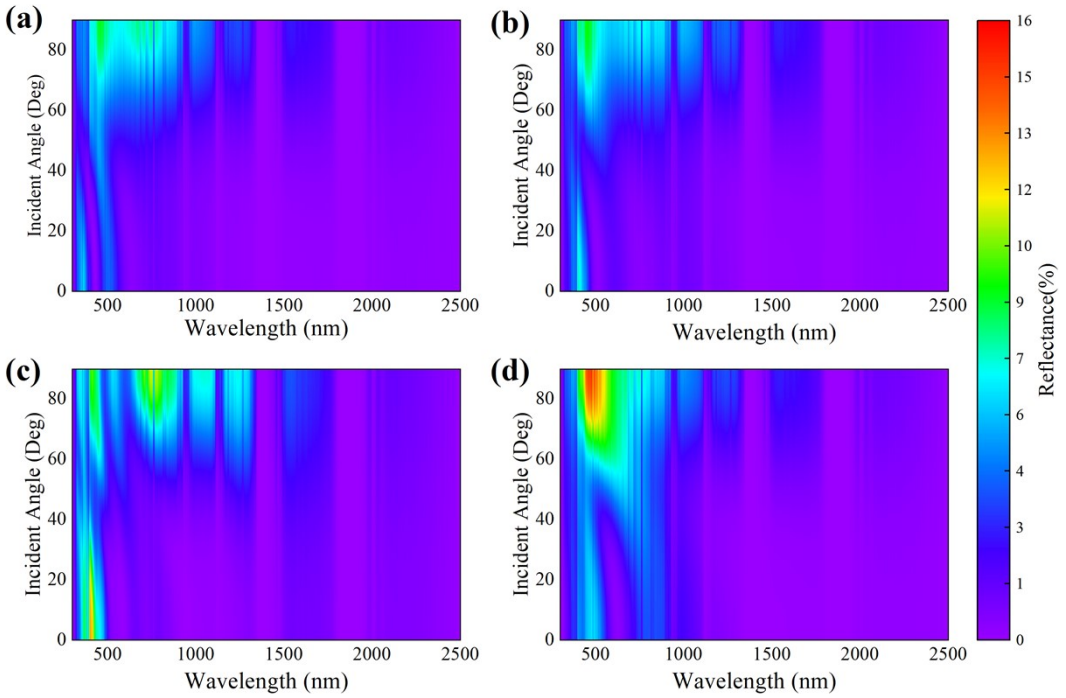

Fig. S3 (PU/MCS as substrate) Reflectance characteristics of the structures individually optimized by (a) GA, (b) PSO, (c) SA, and (d) QID, with $R_{w\text{-}ave}$ as the objective function, for wavelengths from 300 to 2500 nm over the full angle of incidence.

The three-layer structure of GRITCs based on CFs/CNTs (surface refractive index n_s = 2.7)[2] with the optimized SNA is designed.

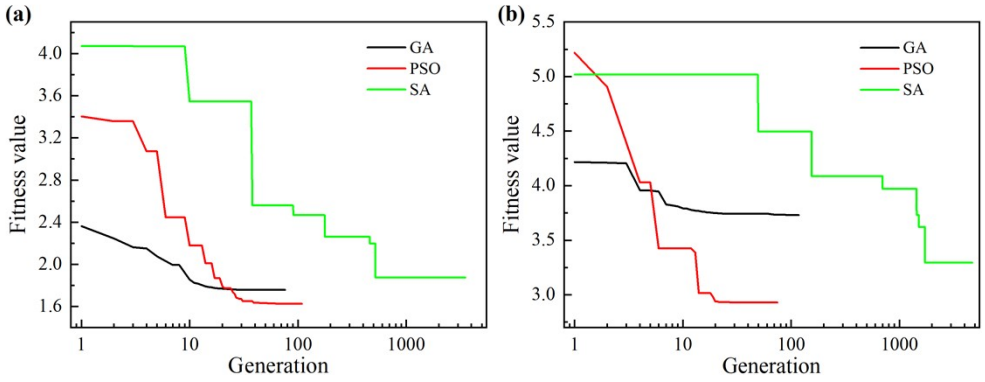

Fig. S4 (CFs/CNTs as substrate) The convergence curves of GA, PSO, and SA with (a) R_{ave} or (b) $R_{w\text{-}ave}$ as the fitness function.

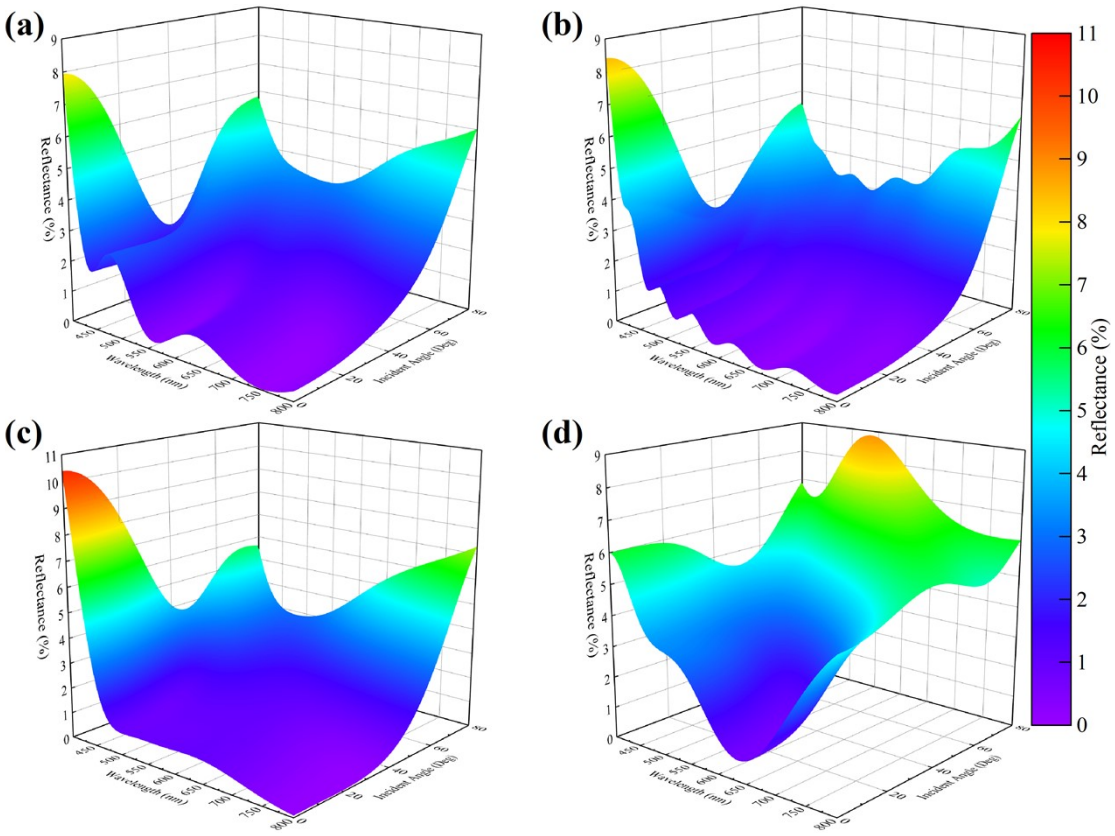

Fig. S5 (CFs/CNTs as substrate) Reflectance characteristics of the structures individually optimized by (a) GA, (b) PSO, (c) SA, and (d) QID, with R_{ave} as the objective function, for wavelengths from 400 to 800 nm and incident angles from 0° to 80°.

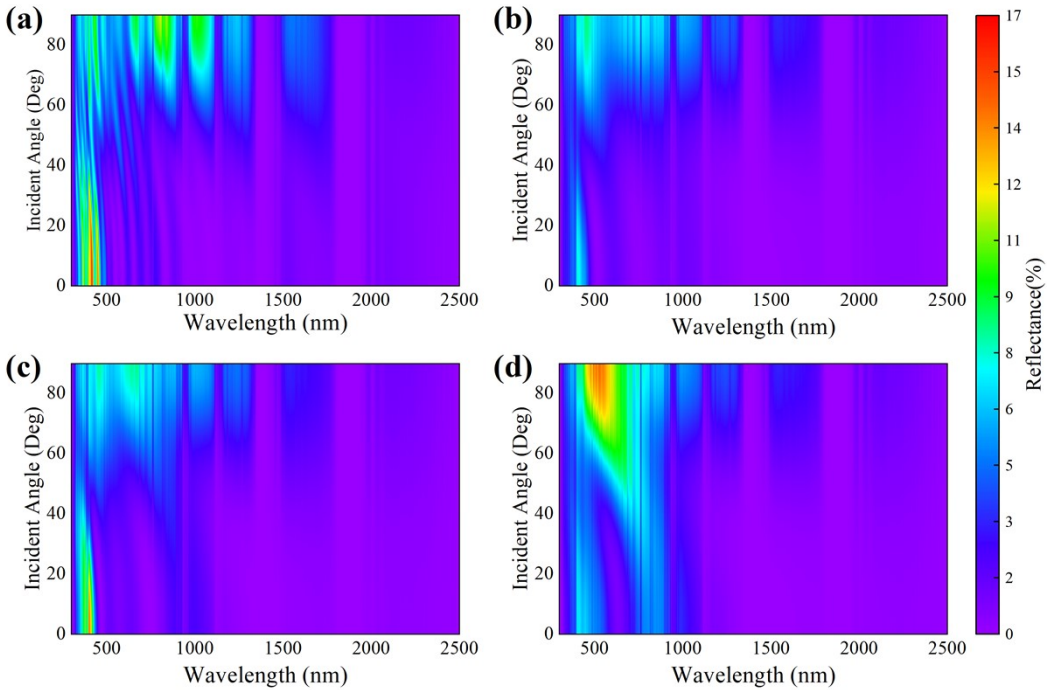

Fig. S6 (CFs/CNTs as substrate) Reflectance characteristics of the structures individually optimized by (a) GA, (b) PSO, (c) SA, and (d) QID, with $R_{w\text{-}ave}$ as the objective function, for wavelengths from 300 to 2500 nm over the full angle of incidence.

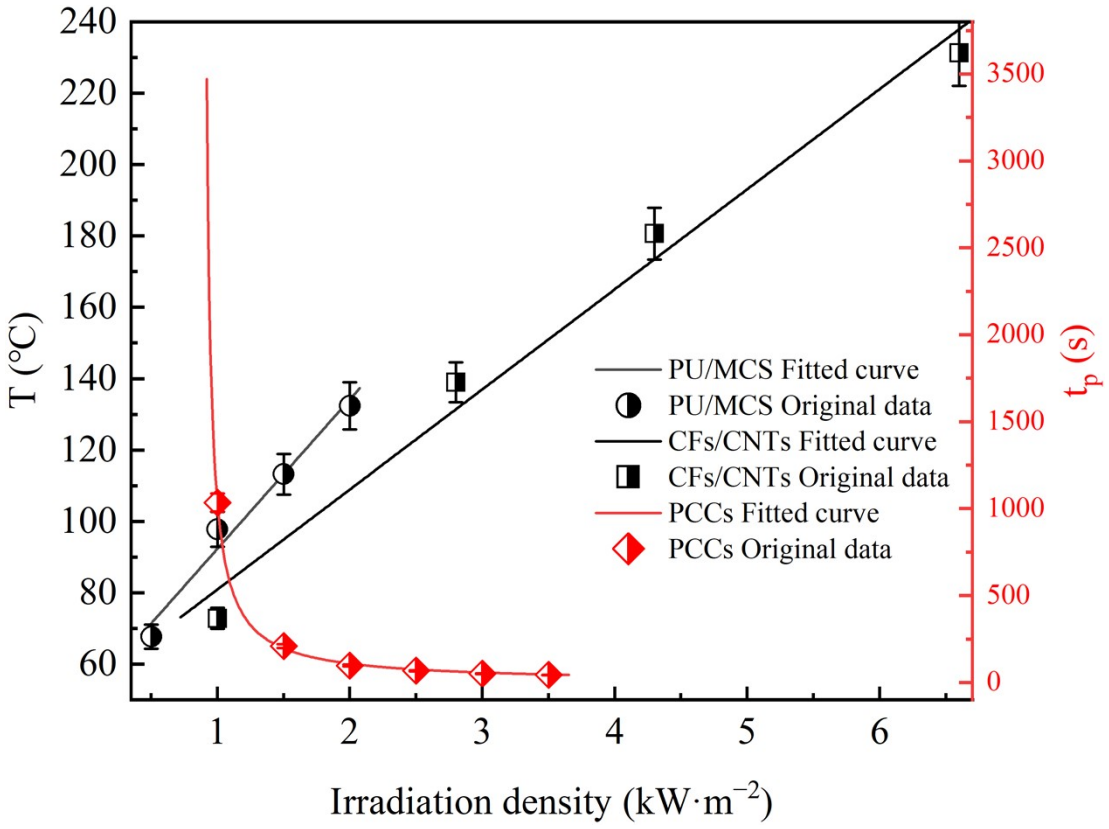

Fig. S7 Fitted curves of the main parameters of the three photothermal conversion materials as a function of irradiation density.

References

[1] Y. Zhang, Z. Qiang and B. D. Vogt, *RSC Adv.*, 2014, **4**, 44858-44867.

[2] T. Nishihara, A. Takakura, M. Shimasaki, K. Matsuda, T. Tanaka, H. Kataura and Y. Miyauchi, *Nanophotonics*, 2022, **11**, 1011-1020.