Synthesis of Photothermally Coalesced WS_2 Nano-Domes for High-Performance Noncontact Triboelectric Nanogenerators

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Non-contact triboelectric nanogenerator (NC-TENG) based on two-dimensional transition metal dichalcogenides (TMDCs) is regarded as a promising next-generation energy harvesting device thanks to its contact-free operation mechanism [1]. However, the intrinsic planar film structure of TMDCs limits local electric field concentration, thereby restricting device performance. Herein, we present a novel laser annealing method that enables the morphologically tunable synthesis of both film-shaped WS_2 (*f*-WS_2) and dome-shaped WS_2 (*d*-WS_2) by simply adjusting a precursor concentration. When integrated with a PI film, the *d*-WS_2-based NC-TENG exhibits a significantly enhanced open-circuit voltage and current density, representing a fourfold enhancement compared to the *f*-WS_2 counterpart. The dome-shaped architecture significantly enhances local electric field concentration and charge induction, demonstrating its strong potential for high-performance noncontact haptic sensing and energy harvesting applications [2].

References

[1] X. Fu, X. Pan, Y. Liu, J. Li, Z. Zhang, H. Liu, M. Gao, Adv. Funct. Mater. 33 (2023) 2306749.
[2] Y. Zhou, W. Deng, J. Xu, J. Chen, Cell Rep. Phys. Sci. 1 (2020) 100142.

Figures

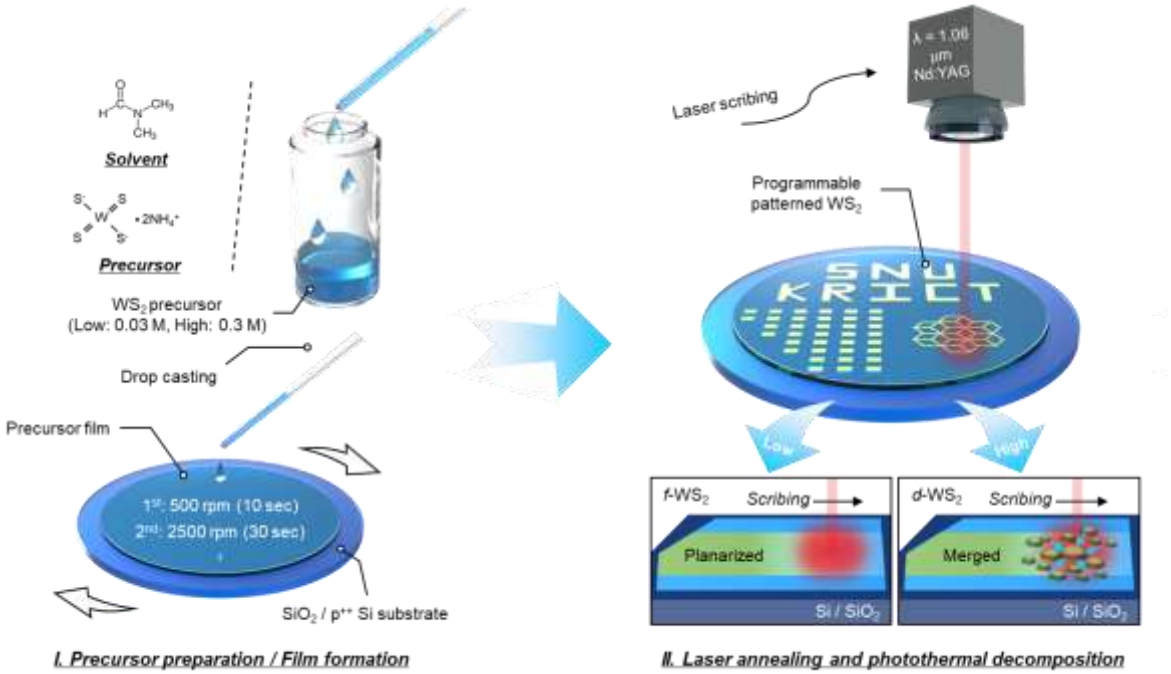

Figure 1: Schematic illustration of laser-assisted procedures for morphologically controllable WS synthesis.