Supporting Information

Copper Sulfide Nanorod-Embedded Urinary Catheter with Hydrophobicity and Photothermal Sterilization

Muhammad Saukani [1,2,†], Chien-Hung Lai [3,4,5,†], Chinmaya Mutalik [6], Dyah Ika Krisnawati [7], Hsiu-Yi Chu [8] and Tsung-Rong Kuo[1,6,*]

1 International Ph.D. Program in Biomedical Engineering, College of Biomedical Engineering, Taipei Medical University, Taipei 11031, Taiwan; d845110002@tmu.edu.tw
2 Department of Mechanical Engineering, Faculty of Engineering, Universitas Islam Kalimantan MAB, Banjarmasin 70124, Kalimantan Selatan, Indonesia
3 Department of Physical Medicine and Rehabilitation, School of Medicine, College of Medicine, Taipei Medical University, Taipei 11031, Taiwan; chlai@tmu.edu.tw
4 Department of Physical Medicine and Rehabilitation, Taipei Medical University Hospital, Taipei 11031, Taiwan
5 Taipei Neuroscience Institute, Taipei Medical University, Taipei 11031, Taiwan
6 Graduate Institute of Nanomedicine and Medical Engineering, College of Biomedical Engineering, Taipei Medical University, Taipei 11031, Taiwan; cm121193@tmu.edu.tw
7 Department of Nursing, Faculty of Nursing and Midwifery, Universitas Nahdlatul Ulama Surabaya, Surabaya 60237, East Java, Indonesia; dyahkrisna77@gmail.com
8 Graduate Institute of Biomedical Materials and Tissue Engineering, College of Biomedical Engineering, Taipei Medical University, Taipei 11031, Taiwan; d825111001@tmu.edu.tw

* Correspondence: trkuo@tmu.edu.tw
† These authors contributed equally to this work.

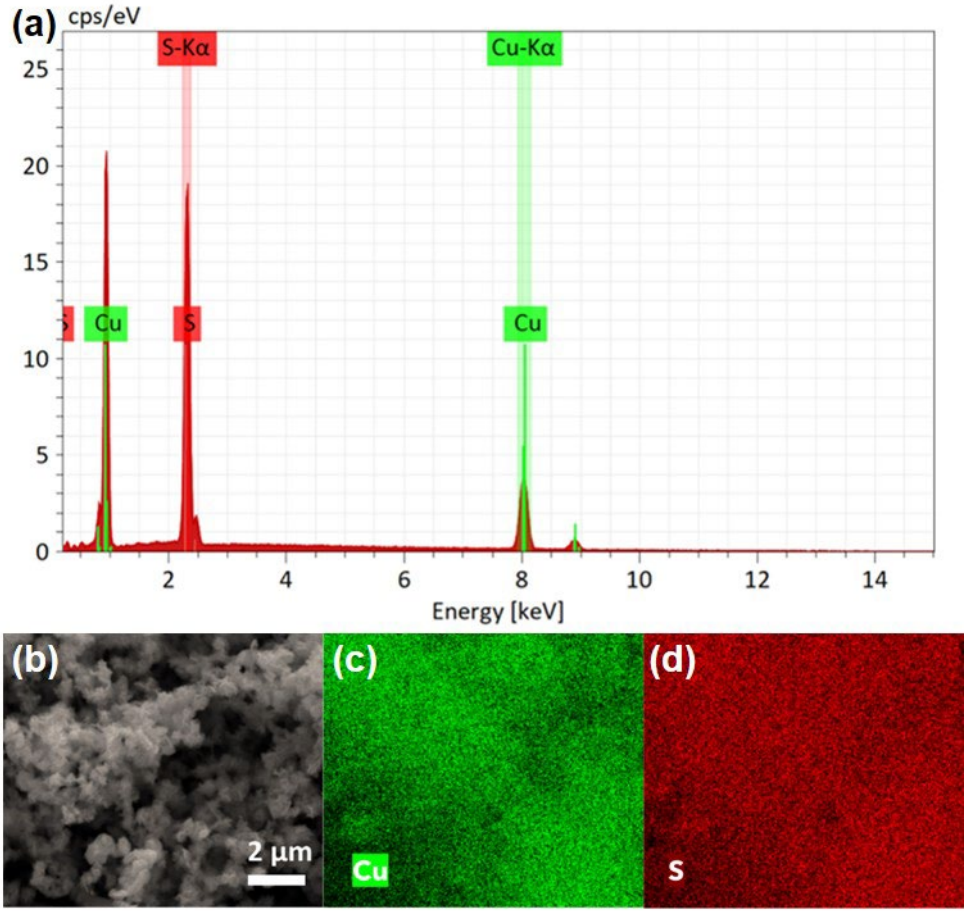


Figure S1. (a) EDX analysis of CuS NRs. (b) SEM image of CuS NRs. The corresponding elemental mapping of (c) Cu and (d) S.

Calculation of Photothermal Conversion Efficiency of the CuS/UC

The photothermal conversion efficiency of the CuS/UC was determined using a previously established method.[1-3] The detailed calculation was as follows:

$$\eta = \frac{hS\,(T_{max} - T_{surr}) - Q_{dis}}{I(1 - 10^{-A_{808}})} \qquad (1)$$

In the equation (1), h is the heat transfer coefficient, S represents the surface area for heat transfer, T_{max} is the equilibrium temperature, and T_{surr} indicates the

temperature of the surrounding environment. Q_{dis} is the heat dissipated to the surrounding environment, I is the intensity of the laser irradiation, and A_{808} is the absorbance of the photothermal material at wavelength 808 nm. In order to obtain hS, a parameter θ is conducted as followed:

(2)

The time constant of a sample system can be obtained by equation (3).

$$\tau_s = \frac{t}{-\ln(\theta)} \qquad (3)$$

The values of hS can be calculated by the equation (4).

$$hS = \frac{m_D\, C_D}{\tau_s} \qquad (4)$$

For example, based on above approach, the photothermal conversion efficiency of the 0.8CuS/UC was calculated. From the experimental design, the T_{surr} was 24.5 °C, the laser intensity is 1.5 W, and the Q_{dis} was 11.28 J. The absorbance of 0.8CuS/UC was 1.56 at wavelength of 808 nm. From Figure S1a, the T_{max} was 70.1 °C. From Figure S2b, τ_s was calculated to be 284.34 s and then hS was obtained as 13.30 mW/°C. Therefore, the photothermal conversion efficiency of 0.8CuS/UC was calculated to be 45.18%. For 0.1CuS/UC, 0.3CuS/UC, and 0.5CuS/UC, photothermal conversion efficiencies were calculated to be 30.67, 34.27, and 34.51, respectively.

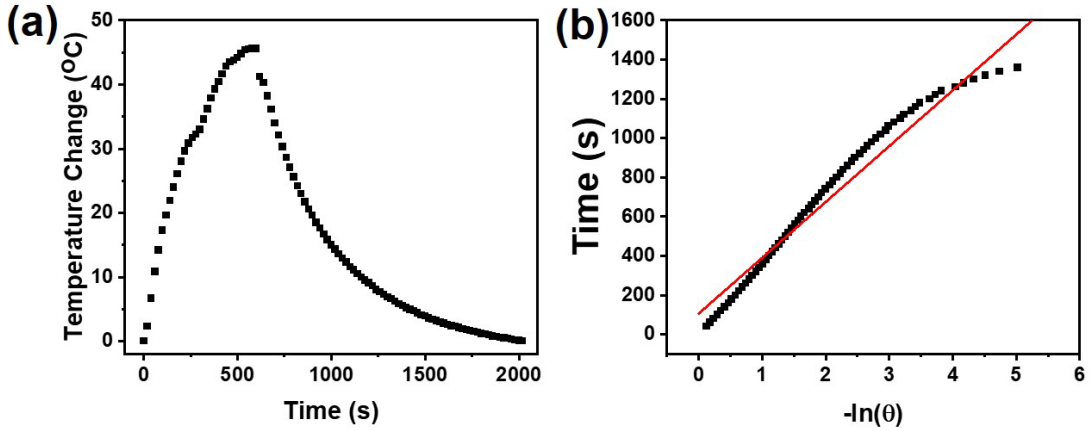


Figure S2. (a) Photothermal curve of 0.8CuS/UC with 808 nm laser irradiation. (b) Linear time data versus -ln(θ) obtained from the cooling period of Figure S2a.

References

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