Supporting Information

Monitoring Thrombin Generation and Screening Anticoagulants through Pulse Laser–Induced Fragmentation of Biofunctional Nanogold on Cellulose Membranes

Yu-Jia Li,[†] Wei-Jane Chiu,[†] Binesh Unnikrishnan,[†] and Chih-Ching Huang[*,†,‡,§]*

[†]Institute of Bioscience and Biotechnology, National Taiwan Ocean University, Keelung, 20224, Taiwan; [‡]Center of Excellence for the Oceans, National Taiwan Ocean University, Keelung, 20224, Taiwan; [§]School of Pharmacy, College of Pharmacy, Kaohsiung Medical University, Kaohsiung, 80708, Taiwan

*E-mail: huanging@ntou.edu.tw

Correspondence: Chih-Ching Huang, Institute of Bioscience and Biotechnology, National Taiwan Ocean University, 2, Beining Road, Keelung 20224, Taiwan; Tel.: 011-886-2-2462-2192 ext: 5517; Fax: 011-886-2-2462-2034; E-mail: huanging@ntou.edu.tw

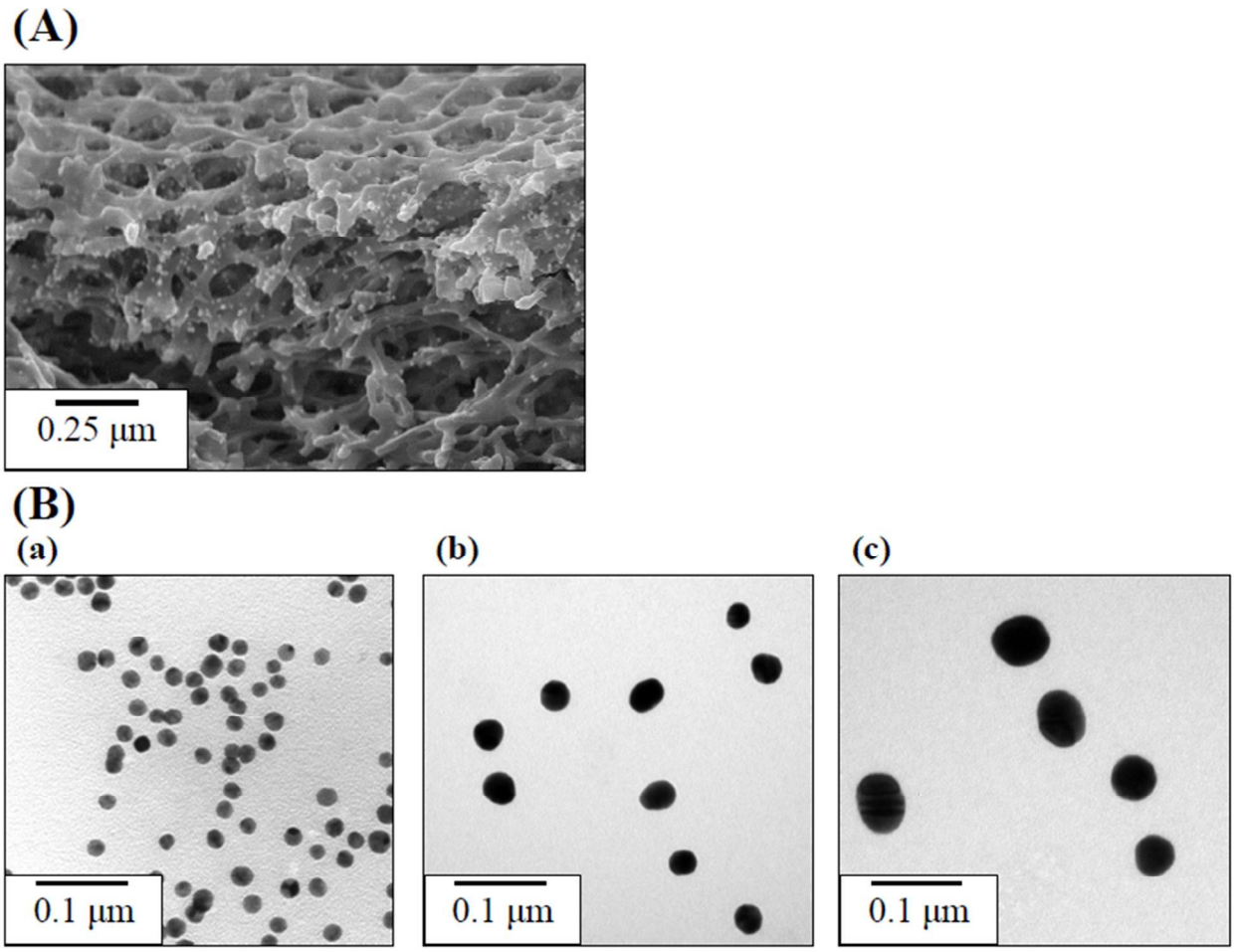

Figure S1. (A) Scanning electron microscopy (SEM) image (lateral view) of a Au NPs–MCEM and (B) TEM images of the synthesized (a) 13-, (b) 32-, and (c) 56-nm Au NPs.

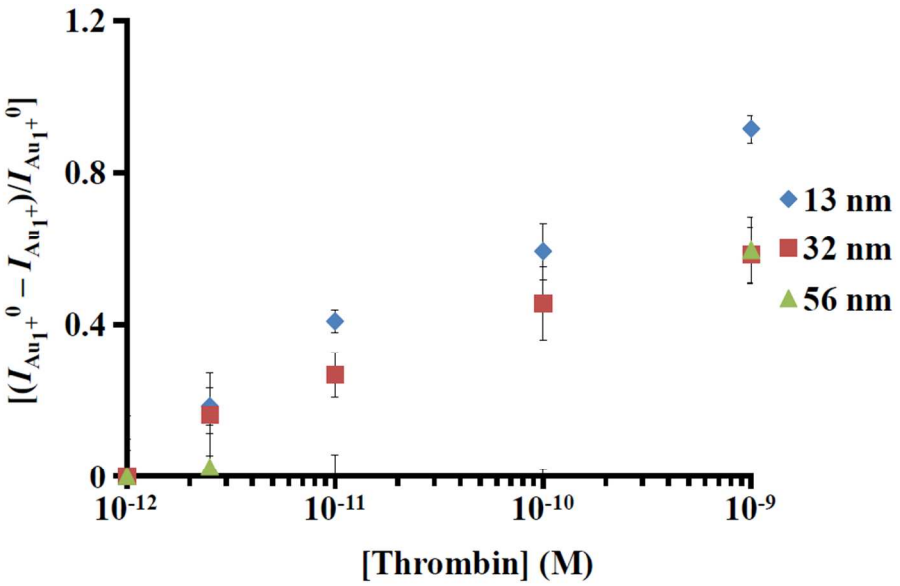

Figure S2. Effect of particle size of Au NPs on LDI-MS analysis of thrombin using Au NPs–MCEM substrates. $I_{Au1+}{}^0$ and I_{Au1+} represent the signal intensities of $[Au_1]^+$ ions in the absence and presence of thrombin, respectively. The Au NPs–MCEM was reacted with fibrinogen (1.0 μM) and thrombin (0–1.0 nM) in PBS.

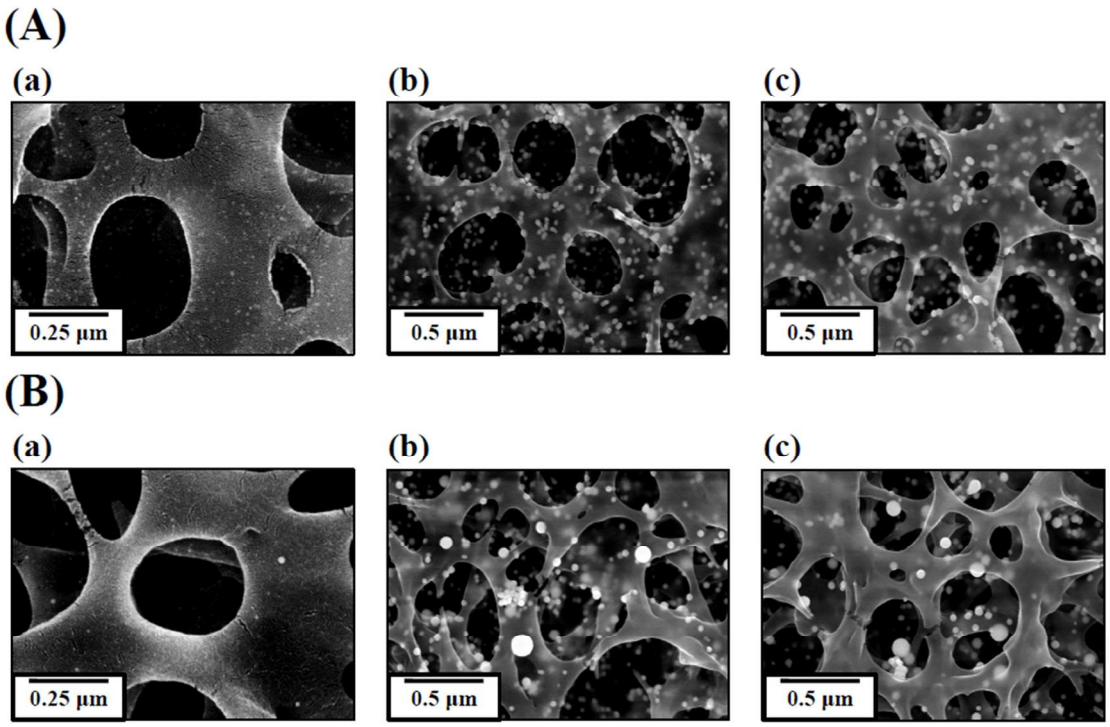

Figure S3. SEM images of Au NPs–MCEMs with Au NPs having dimensions of (a) 13-, (b) 32-, and (c) 56-nm (A) before and (B) after pulse laser irradiation (5.57×10^4 W cm^{-2}). Other conditions were the same as those described in Figure 1.

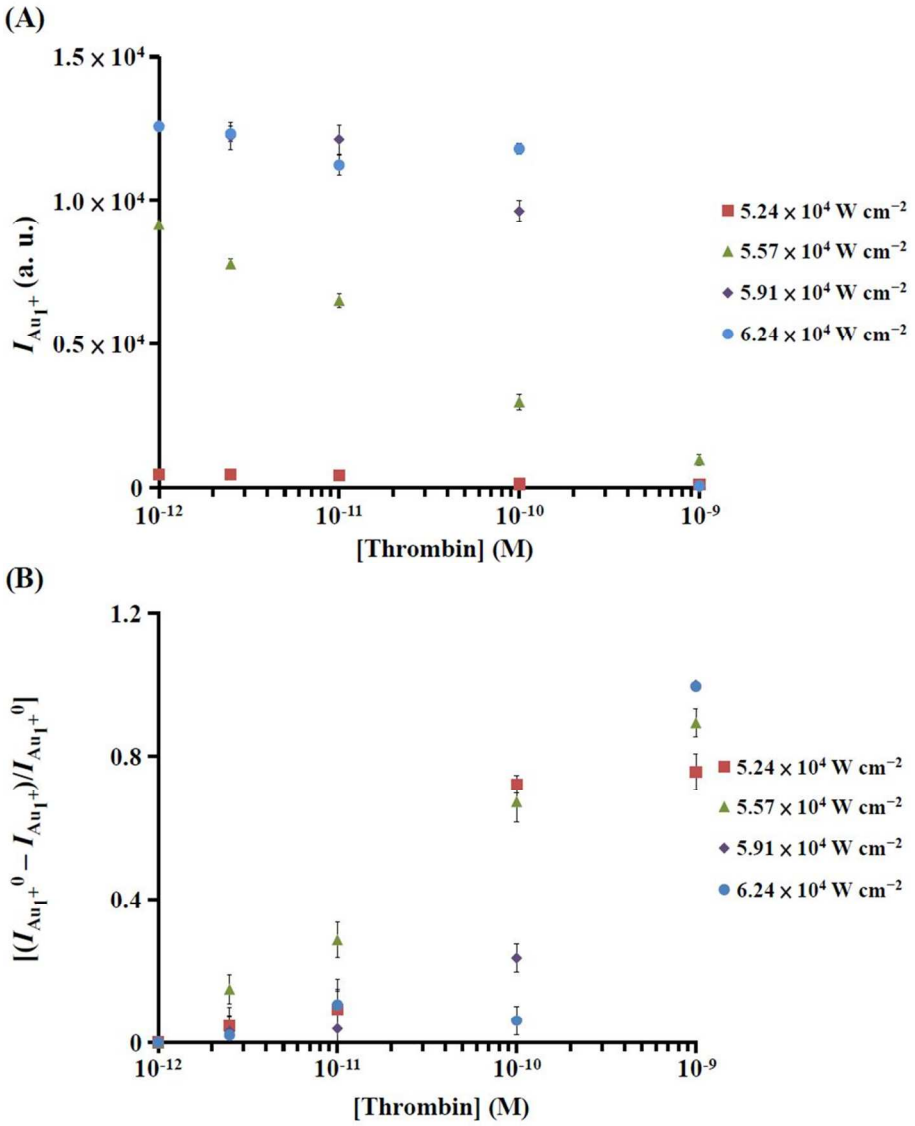

Figure S4. (A) $[Au_1]^+$ intensities (I_{Au1+}) and (B) relative values of $[(I_{Au1+}{}^0 - I_{Au1+})/I_{Au1+}{}^0]$ of $[Au_1]^+$ ions obtained from Au NPs–MCEMs after irradiation from a pulsed Nd:YAG laser (power densities from 5.24×10^4 to 6.24×10^4 W cm^{-2}). The Au NPs–MCEMs were reacted with fibrinogen (1.0 μM) and thrombin (0–1.0 nM) in PBS solution. $I_{Au1+}{}^0$ and I_{Au1+} represent the signal intensities of $[Au_1]^+$ ions in the absence and presence of thrombin, respectively. Error bars represent standard deviations from four repeated experiments. Other conditions were the same as those described in Figure 1.

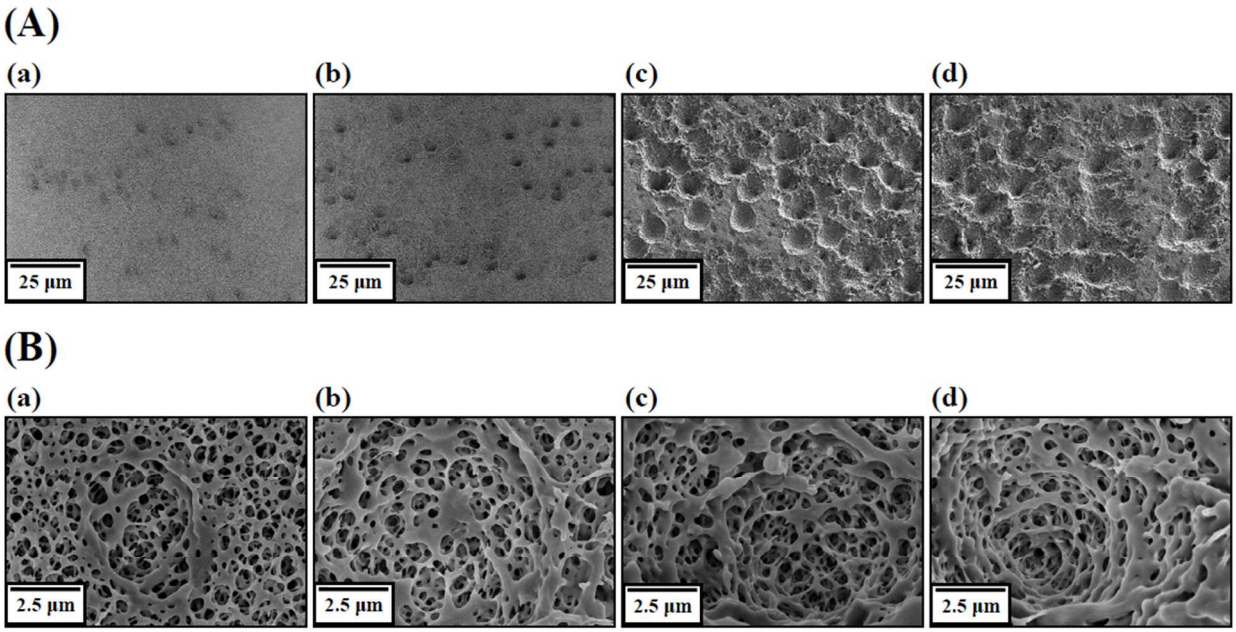

Figure S5. (A) Low- and (B) high-magnification SEM images of Au NPs–MCEMs after laser irradiation at power densities of (a) 5.24×10^4, (b) 5.57×10^4, (c) 5.91×10^4, and (d) 6.24×10^4 W cm^{-2}. Other conditions were the same as those described in Figure S4.

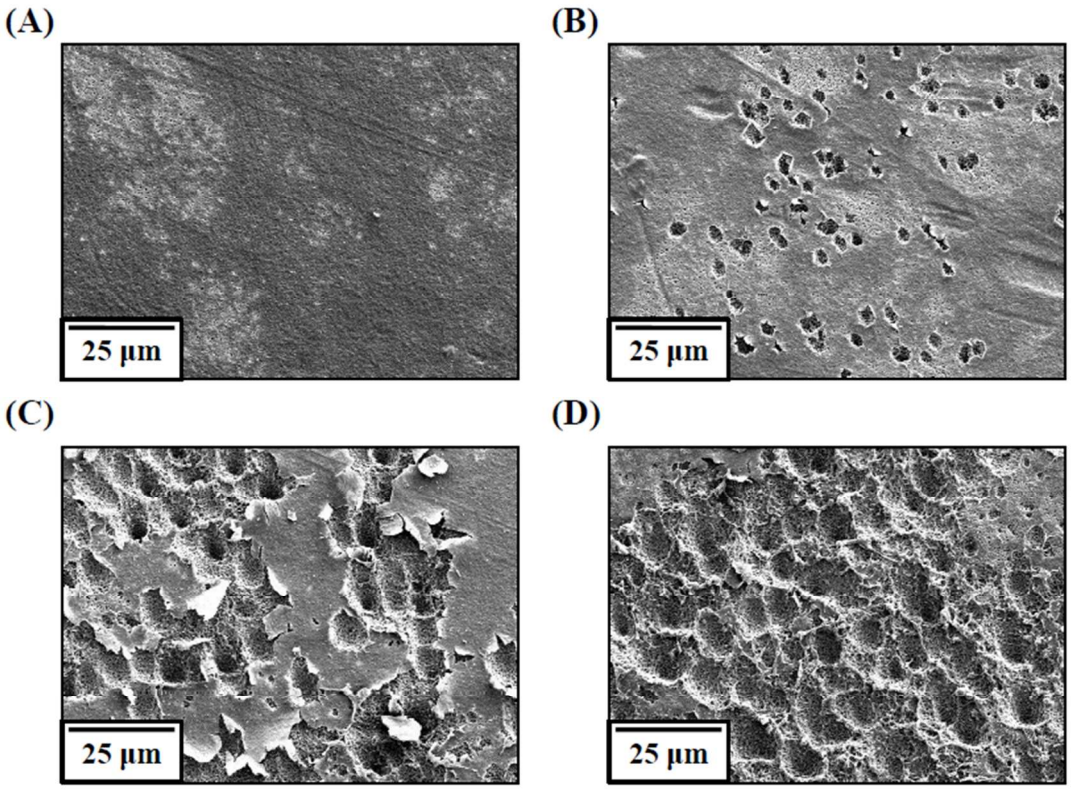

Figure S6. SEM images of a fibrin–Au NPs–MCEM after laser irradiation at power densities of (A) 5.24×10^4, (B) 5.57×10^4, (C) 5.91×10^4, and (D) 6.24×10^4 W cm^{-2}. The Au NPs–MCEM was reacted with fibrinogen (1.0 μM) and thrombin (1.0 nM) in PBS solution. Other conditions were the same as those described in Figure 1.

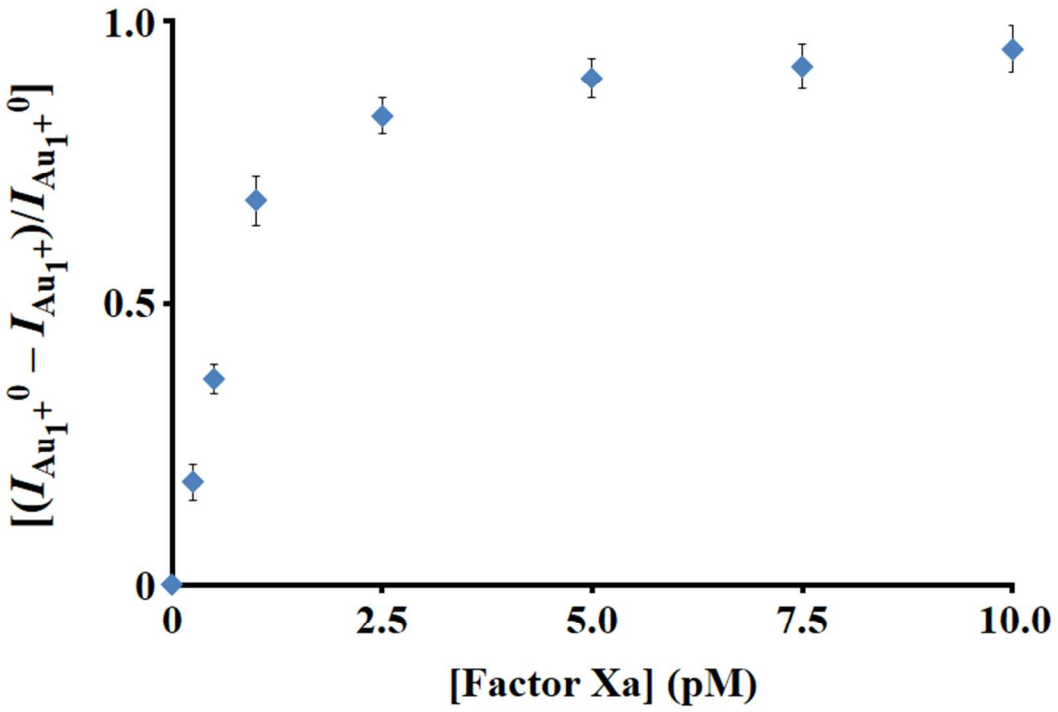

Figure S7. Validation of the use of the Fib–Au NPs–MCEM/LDI-MS system for the detection of Factor Xa (0–10 pM) spiked in 200-fold diluted plasma samples. $I_{Au1+}{}^0$ and I_{Au1+} represent the signal intensities of $[Au_1]^+$ ions in the absence and presence of spiked Factor Xa, respectively. Error bars represent standard deviations from three repeated experiments. Other conditions were the same as those described in Figure 4.