Rapid detection and quantitative analysis of thiram in fruits using shape-adaptable flexible SERS substrate combined with deep learning

Hongjun Wang, Ziyang Bian, Yue Wang, Huijuan Niu, Zhenshan Yang, Hefu Li*

School of Physical Science and Information Engineering, Liaocheng University, Liaocheng 252000, China
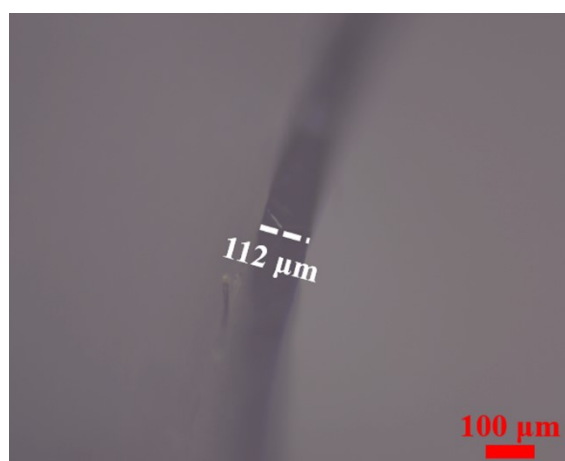
Corresponding author: lihefu@lcu.edu.cn

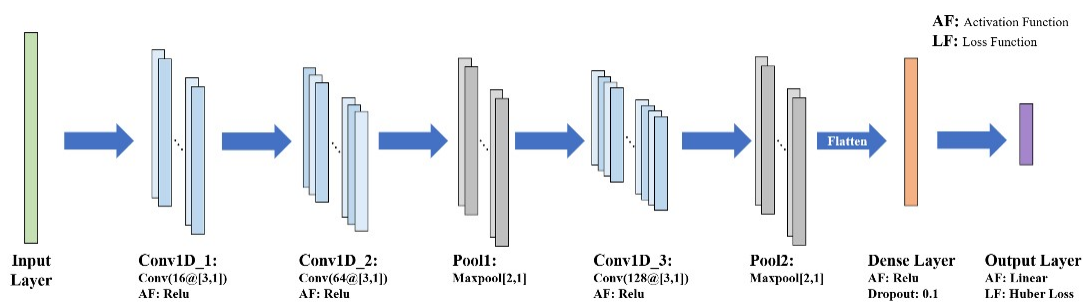**Fig. S1** The optical microscopy image of the cross-section of PDMS film.

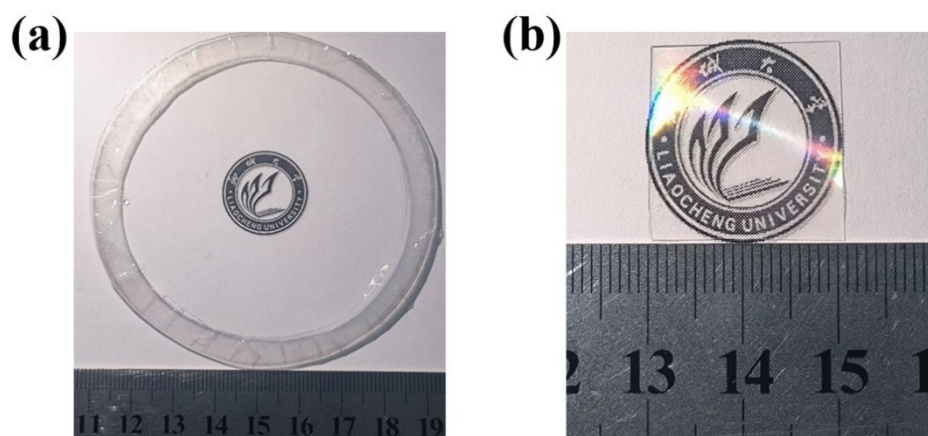**Fig. S2** The structure diagram of 1D CNN model.

Fig. S3 (a) Photo of a flat PDMS film obtained by the floating-on-water method, (b) photo of a wrinkled PDMS film prepared by oxygen plasma treatment.
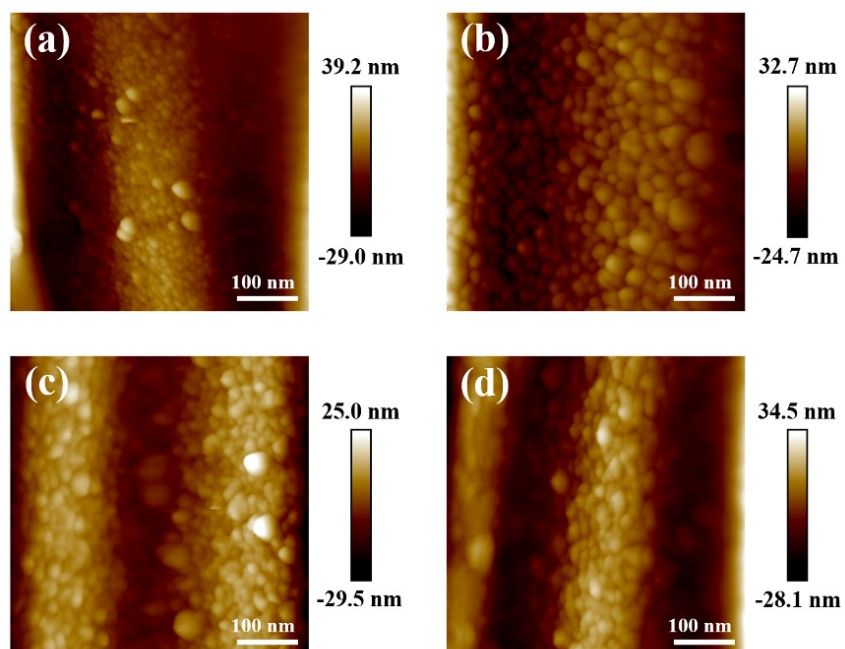

Fig. S4 AFM images of Ag NPs on corrugated PDMS films prepared using different deposition times: (a) 5 s, (b) 10 s, (c) 15 s, and (d) 20 s.
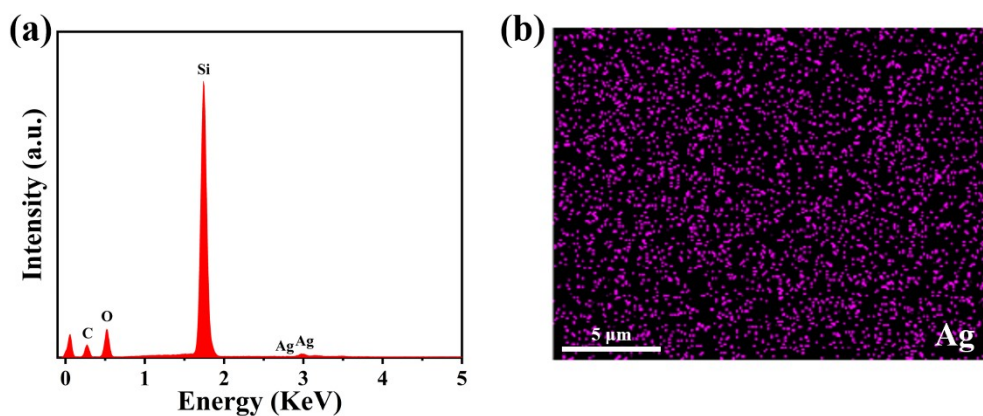
Fig. S5 (a) The EDS spectra of corrugated Ag NPs@PDMS film prepared with a deposition time of 15 s, and (b) the corresponding EDS mapping of the Ag NPs.
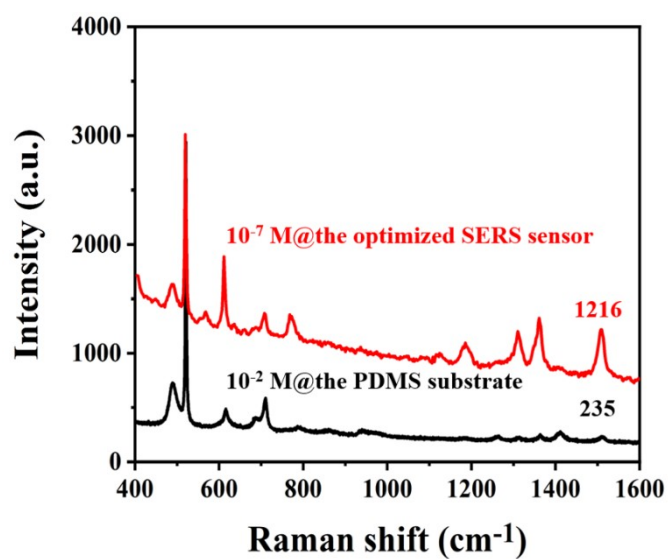

Fig. S6 Comparison of SERS spectra and normal Raman of R6G on the corrugated Ag NPs@PDMS SERS substrate (10^{-7} M) and flat PDMS film (10^{-2} M).
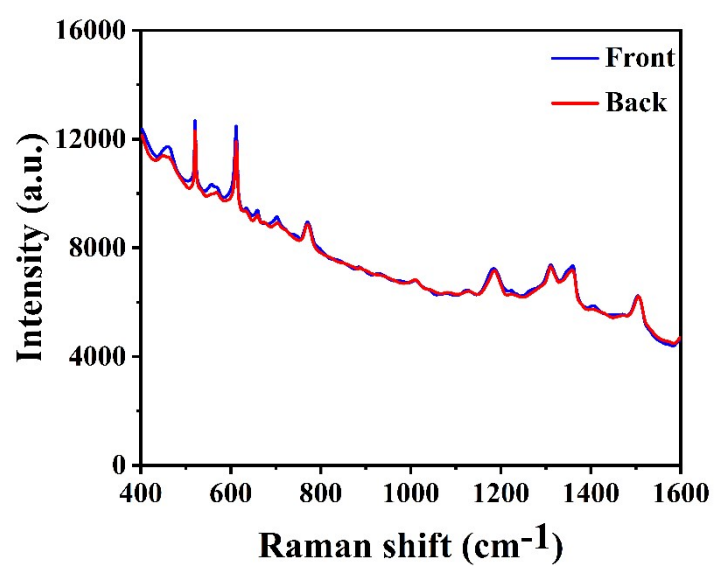
Fig. S7 SERS spectra of R6G (10^{-5} M) obtained from both sides of the wrinkled Ag NPs@PDMS thin film.