



## Supporting Information

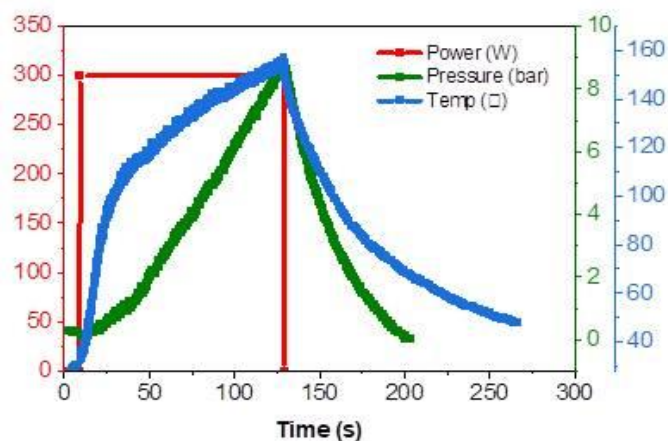
for

### **On the stability of microwave-fabricated SERS substrates – chemical and morphological considerations**

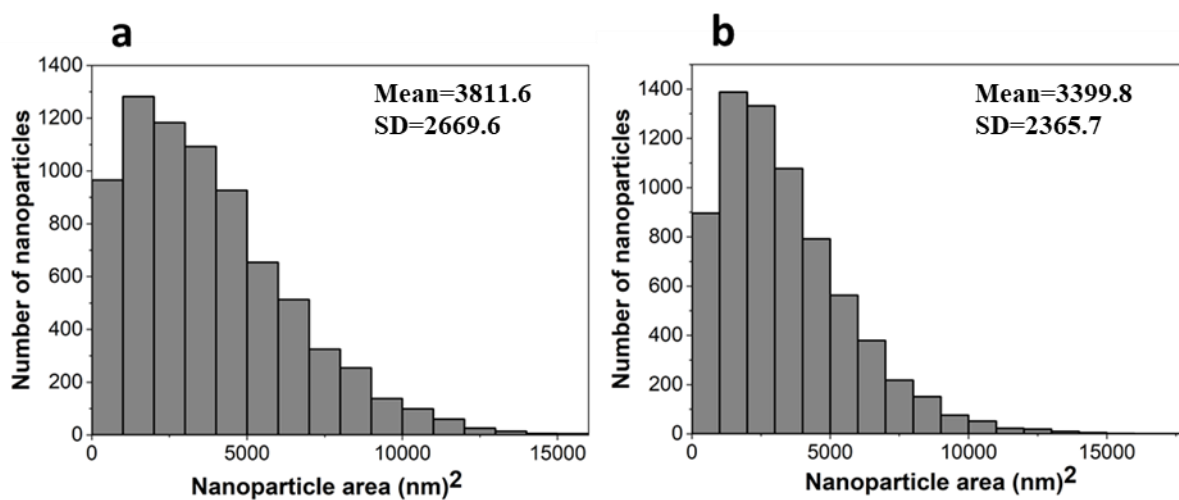
Limin Wang, Aisha Adebola Womiloju, Christiane Höppener, Ulrich S. Schubert  
and Stephanie Hoepfner

*Beilstein J. Nanotechnol.* **2021**, *12*, 541–551. [doi:10.3762/bjnano.12.44](https://doi.org/10.3762/bjnano.12.44)

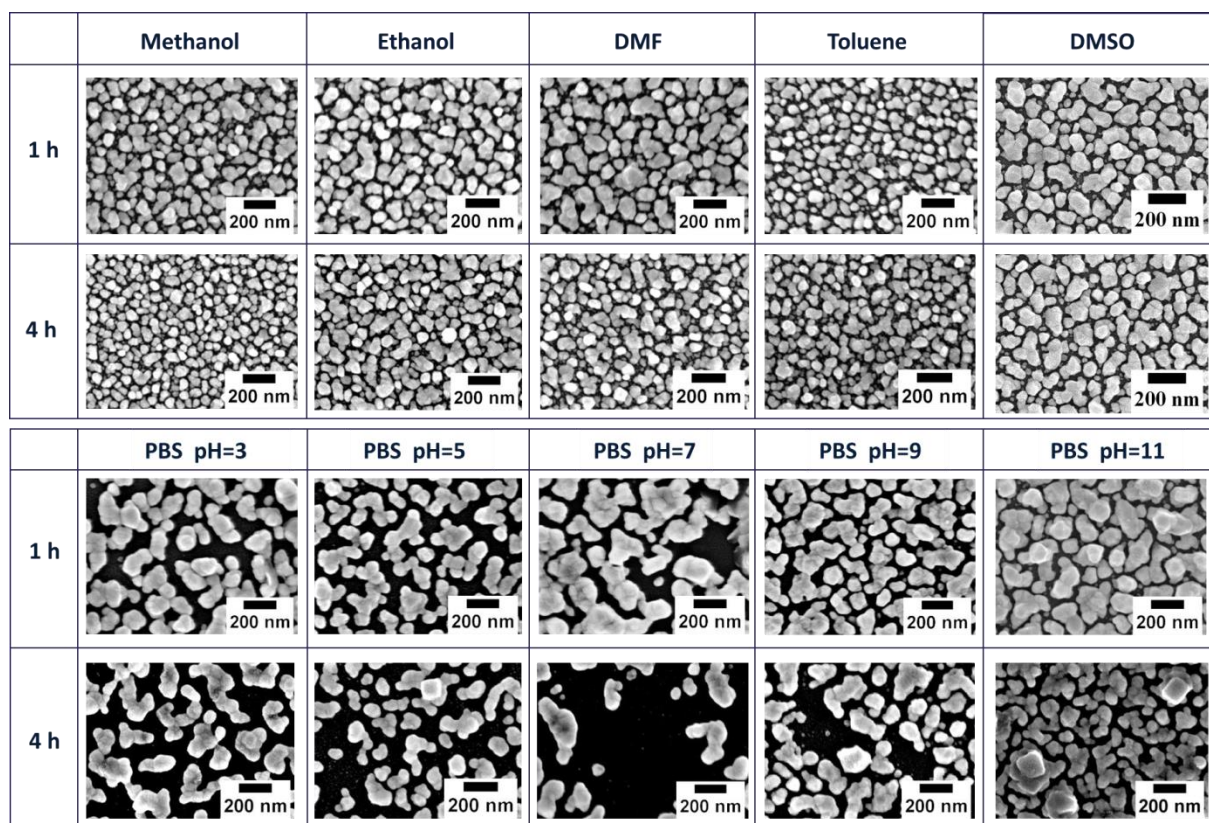
## Additional figures and tables



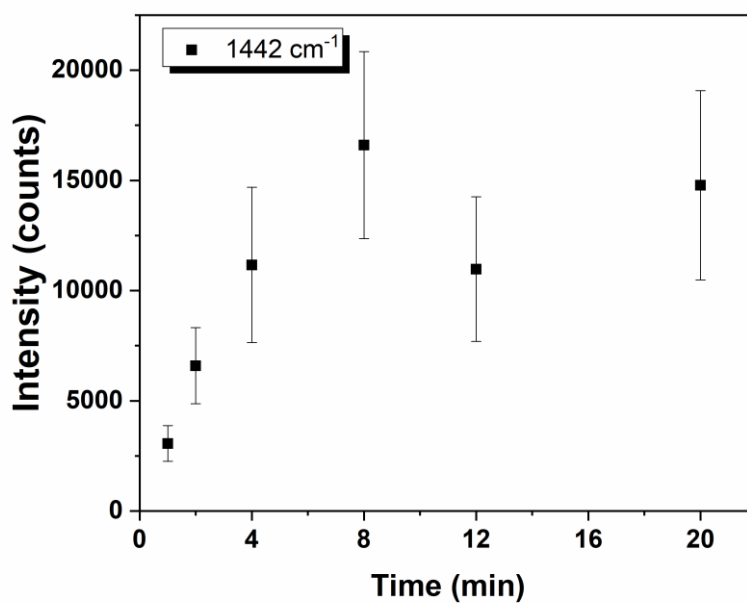
**Figure S1:** Representative diagram depicting the power, pressure, and temperature measured during the microwave-assisted coating of the glass substrate.



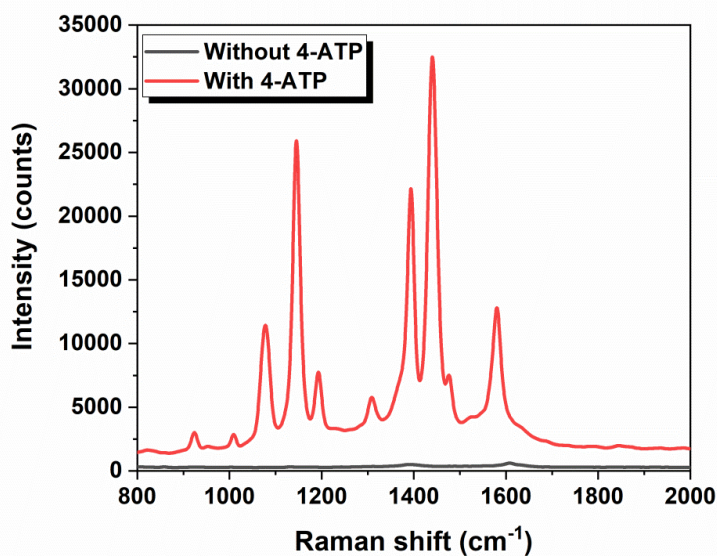
**Figure S2:** Histograms of SERS substrates from different batches after their preparation: (a) batch 1 and (b) batch 2.



**Figure S3:** SEM images of the SERS substrates immersed into different organic solvents and PBS solutions for 1 and 4 h, respectively.



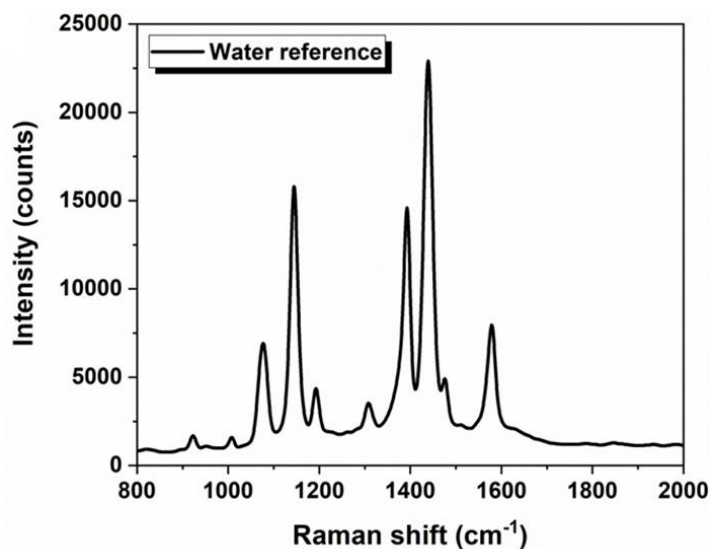
**Figure S4:** Raman intensities found for the marker peak at  $1442\text{ cm}^{-1}$  of a monolayer prepared from  $10^{-4}\text{ M}$  4-ATP. After eight minutes the peak intensity reaches a plateau, indicating the formation of a complete monolayer on the SERS substrates.



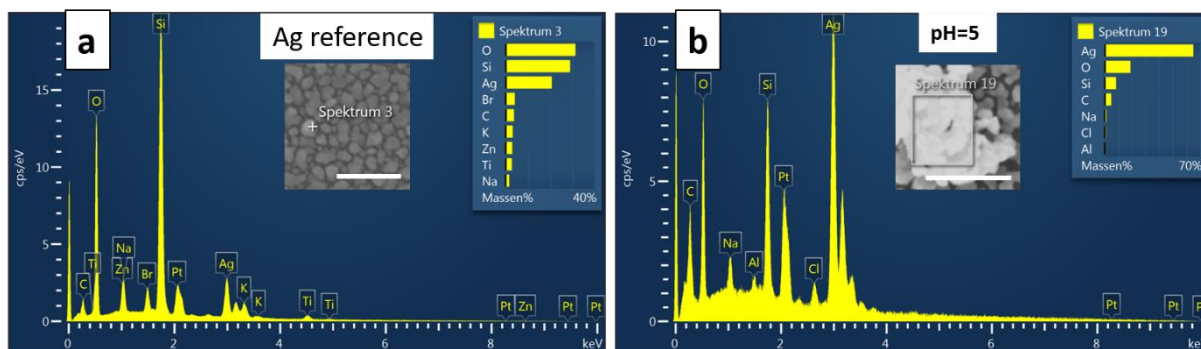
**Figure S5:** Reference Raman spectra of a 4-ATP-coated, non-treated, clean SERS substrate (red) and the Raman spectrum of the SERS substrate only (black). The corresponding peak assignment is provided in Table S1.

**Table S1:** Peak assignment for the SERS spectrum shown in Figure S5 [1,2]. A dimerization process takes place and leads to the transformation of 4-ATP into 4,4'-dimercaptoazobenzene (DMAB) as seen in the appearance of the  $b_2$  modes or  $a_g$ , respectively [1].

SERS band frequency/cm <sup>-1</sup>	Assignment (4-APT/DMAB)
1580	$\nu(\text{CC})$ , $b_2/a_g$ mode
1440	$\delta(\text{CH}) + \nu(\text{CC})$ , $b_2/a_g$ mode
1394	$\nu(\text{CC}) + \delta(\text{CH})$ , $b_2/a_g$ mode
1145	$\delta(\text{CH})$ , $a_1$ mode
1078	$\nu(\text{CS})$ , $a_1$ mode



**Figure S6:** Reference Raman spectrum of a monolayer of 4-ATP self-assembled on a water-treated SERS substrate.



**Figure S7:** EDX elemental analysis of the SERS substrate without treatment (a) and treated with PBS buffer of pH 5 (b). The insets represent the SEM images. Scale bar: 500 nm. The elements O, Si, C, Na, and Al in (b) could be attributed to the glass substrate.

**Table S2:** Main components of different buffer solutions.

Different buffer solutions	Ingredients	Cations	Anions
<b>PBS pH 3</b>	NaCl, KCl, NaH <sub>2</sub> PO <sub>4</sub> , KH <sub>2</sub> PO <sub>4</sub>	Na <sup>+</sup> , K <sup>+</sup>	Cl <sup>-</sup> , H <sub>2</sub> PO <sub>4</sub> <sup>-</sup>
<b>PBS pH 5</b>	NaCl, KCl, NaH <sub>2</sub> PO <sub>4</sub> , KH <sub>2</sub> PO <sub>4</sub>	Na <sup>+</sup> , K <sup>+</sup>	Cl <sup>-</sup> , H <sub>2</sub> PO <sub>4</sub> <sup>-</sup>
<b>Acetate pH 5</b>	CH <sub>3</sub> COONa, CH <sub>3</sub> COOH	Na <sup>+</sup>	CH <sub>3</sub> COO <sup>-</sup>
<b>PBS pH 7</b>	NaCl, KCl, Na <sub>2</sub> HPO <sub>4</sub> , KH <sub>2</sub> PO <sub>4</sub>	Na <sup>+</sup> , K <sup>+</sup>	Cl <sup>-</sup> , HPO <sub>4</sub> <sup>2-</sup> , H <sub>2</sub> PO <sub>4</sub> <sup>-</sup>
<b>HBG pH 7</b>	HEPES, glucose		
<b>TBE pH 8</b>	Tris base, boric acid, EDTA		
<b>PBS pH 9</b>	NaCl, KCl, Na <sub>2</sub> HPO <sub>4</sub> , K <sub>2</sub> HPO <sub>4</sub>	Na <sup>+</sup> , K <sup>+</sup>	Cl <sup>-</sup> , HPO <sub>4</sub> <sup>2-</sup>
<b>Carbonate pH 10</b>	NaHCO <sub>3</sub> , Na <sub>2</sub> CO <sub>3</sub>	Na <sup>+</sup>	HCO <sub>3</sub> <sup>-</sup> , CO <sub>3</sub> <sup>2-</sup>
<b>PBS pH 11</b>	NaCl, KCl, Na <sub>2</sub> HPO <sub>4</sub> , K <sub>2</sub> HPO <sub>4</sub>	Na <sup>+</sup> , K <sup>+</sup>	Cl <sup>-</sup> , HPO <sub>4</sub> <sup>2-</sup>

[1] Huang, Y.-F.; Wu, D.-Y.; Zhu, H.-P.; Zhao, L.-B.; Liu, G.-K.; Ren, B.; Tian, Z.-Q. *Phys. Chem. Chem. Phys.*, **2012**, *14*, 8485–8497.

[2] Hu, X.; Wang, T.; Wang, L.; Dong, S. *J. Phys. Chem. C* **2007**, *111*, 6962–6969.