**Flexible cotton-AuNP thread electrode for non-enzymatic sensor of uric acid in urine**

Kanyapat Teekayupak1, Nipapan Ruecha2, Orawon Chailapakul1\*, Nadnudda Rodthongkum2,3\*

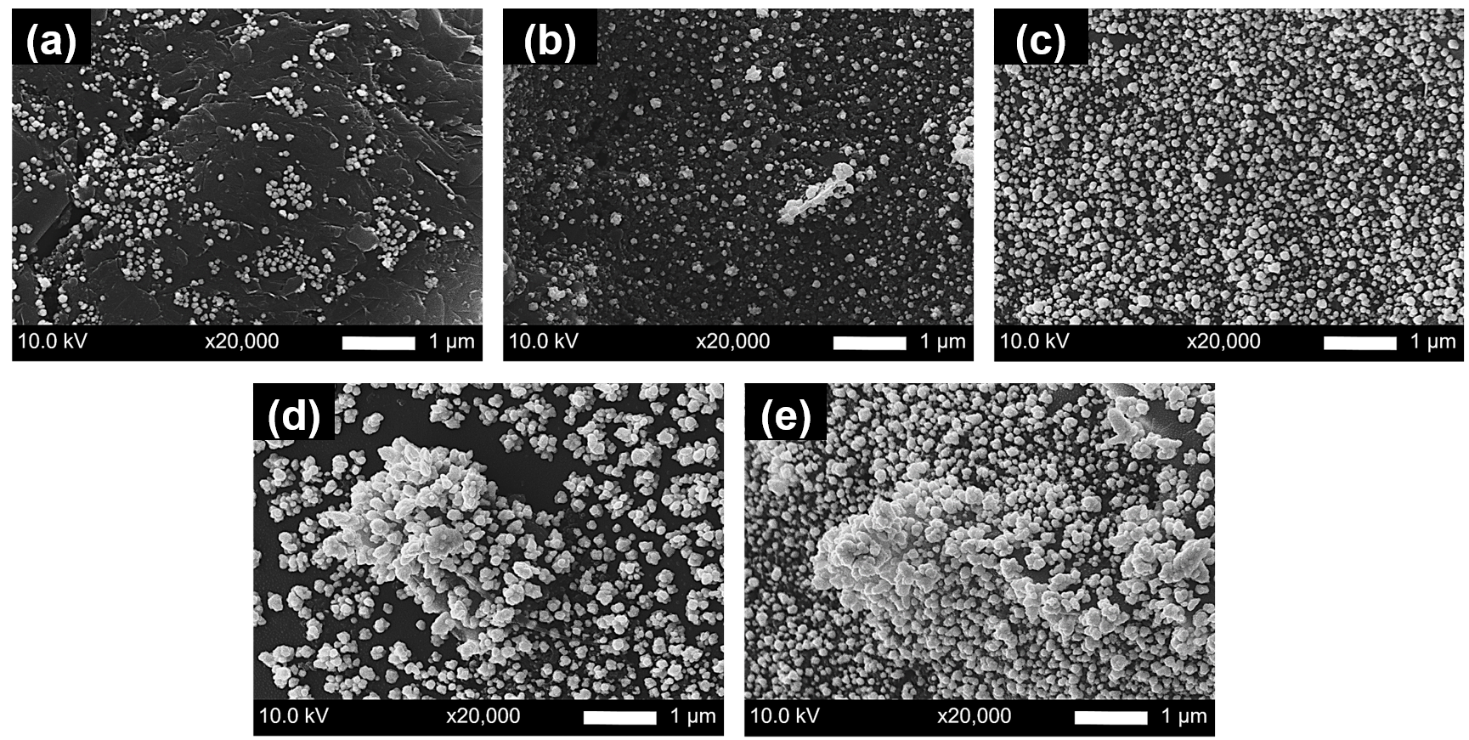
*1Electrochemistry and optical spectroscopy Center of Excellent (EOSCE), Department of Chemistry, Faculty of Science, Chulalongkorn University, Pathumwan, Bangkok 10330, Thailand*

*2Metallurgy and Materials Science Research Institute, Chulalongkorn University, Soi Chula 12, Phayathai Road, Pathumwan, Bangkok 10330, Thailand*

*3Center of Excellence in Responsive Wearable Materials, Chulalongkorn University, Bangkok 10330, Thailand*

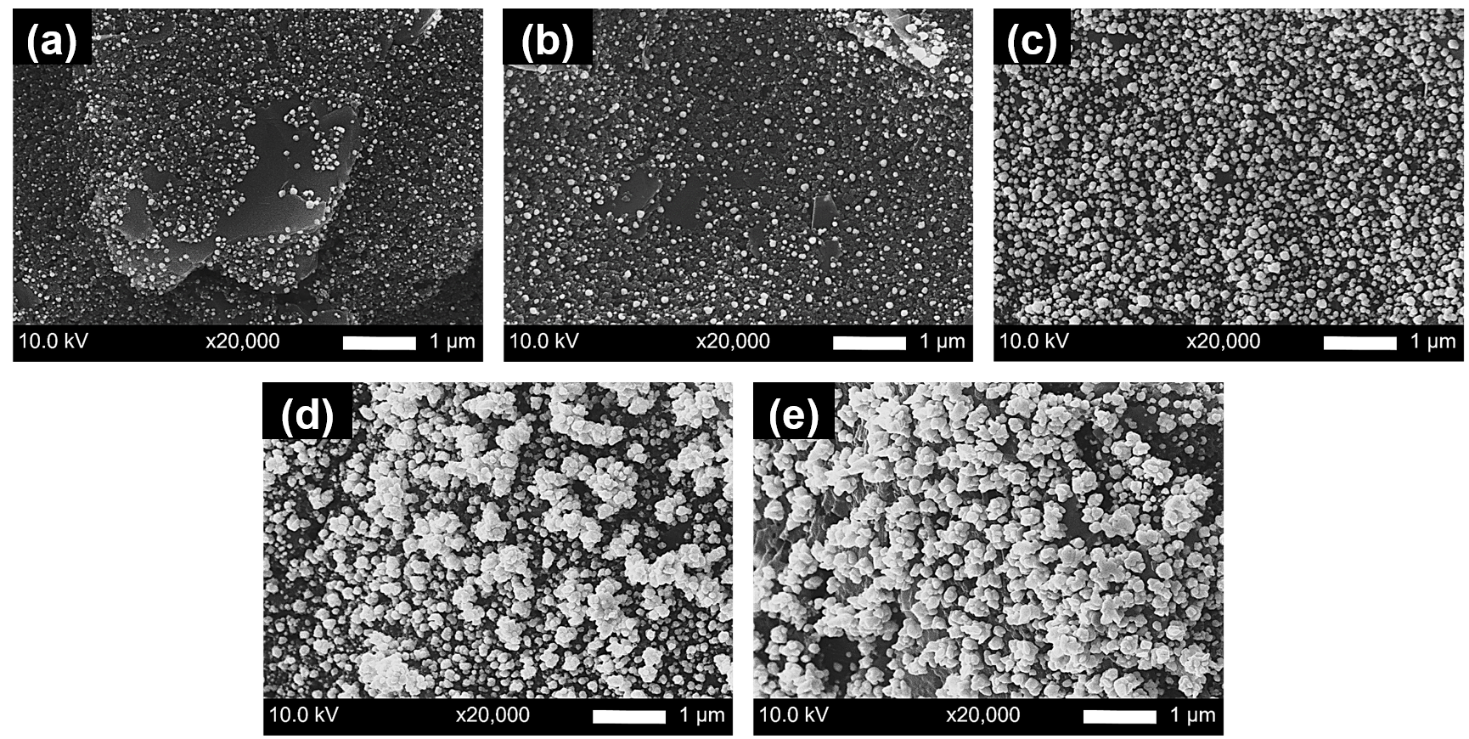
\*Corresponding authors at E-mail addresses:Nadnudda.r@chula.ac.th, Corawon@chula.ac.th

**The effect of HAuCl4 concentration on modified cotton thread-based electrodes.**



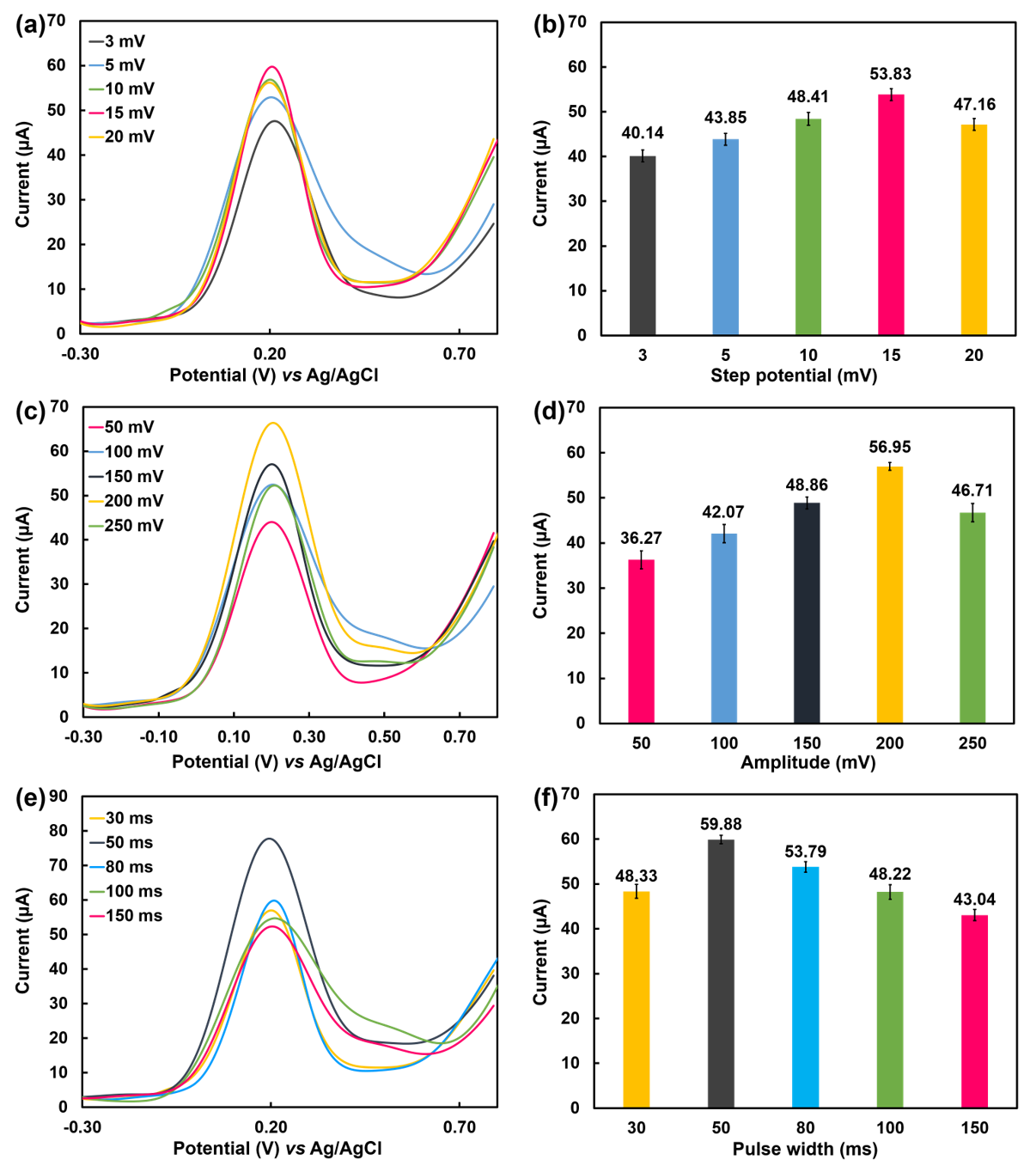
**Fig. S1** SEM images of the AuNPs/carbon-coated cotton thread-based electrodes with different concentration of HAuCl4·3H2O, **(a)** 1.0 mM, **(b)** 2.0 mM, **(c)** 3.0 mM, **(d)** 4.0 mM and **(e)** 5.0 mM with magnification of 20,000**×**.

**The effect of electrodeposition time** **on modified cotton thread-based electrodes.**

****

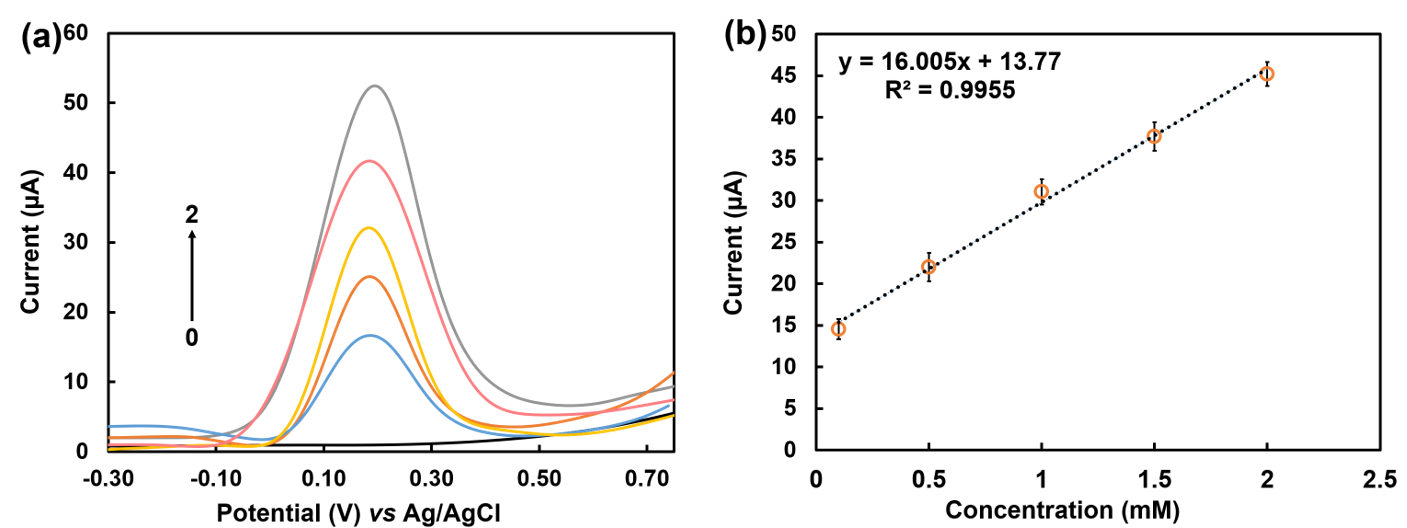
**Fig. S2** SEM images of the AuNPs/carbon-coated cotton thread-based electrodes with different electrodeposition time, **(a)** 30 s, **(b)** 60 s, **(c)** 120 s, **(d)** 180 s and **(e)** 240 s with magnification of 20,000**×**.

**Optimization of parameters for uric acid detection.**



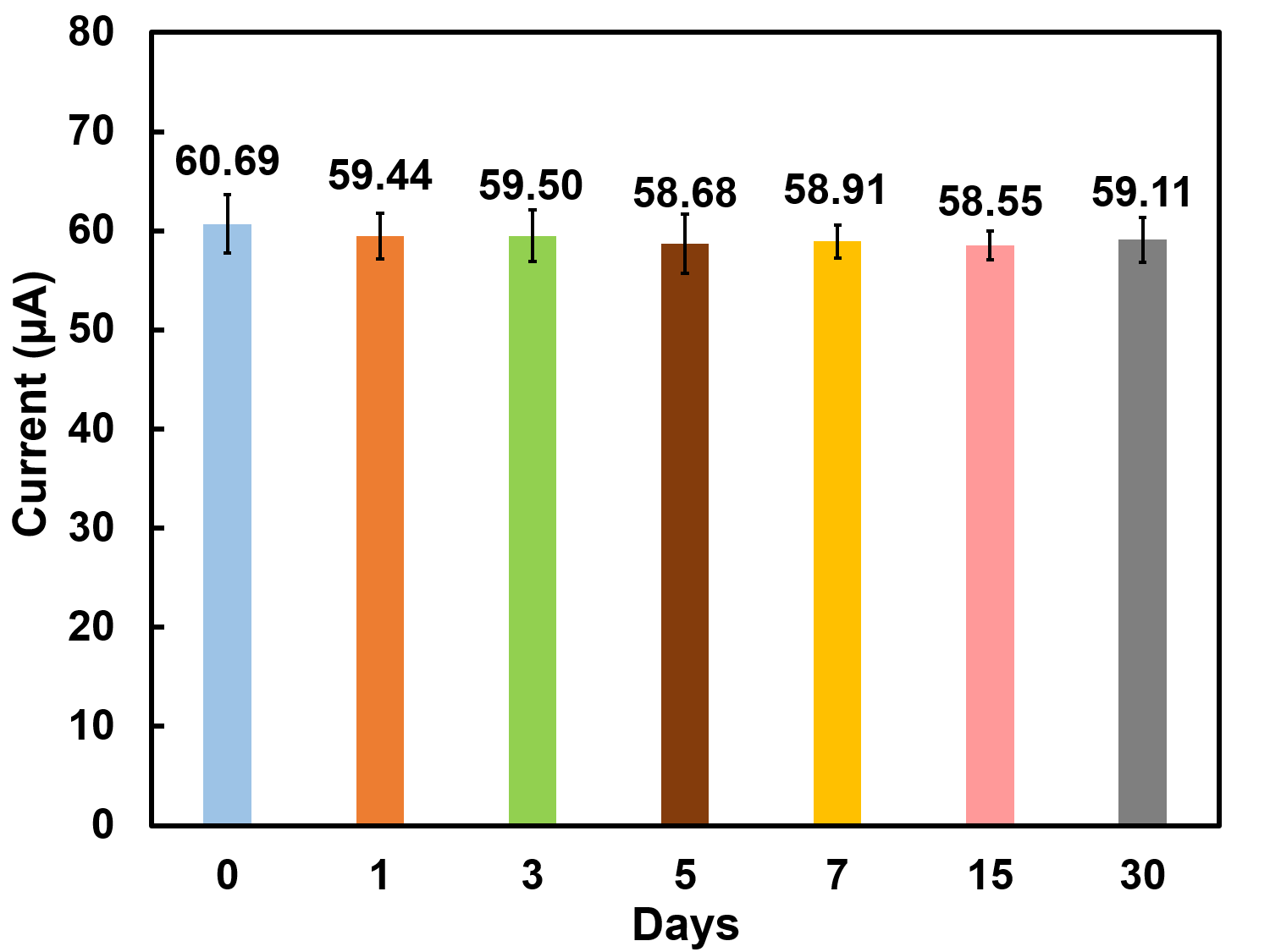
**Fig. S3** Anodic current responses obtained from differential pulse voltammograms of1.0 mM UA using the modified cotton thread-based electrodes with different **(a)** step potentials, **(c)** amplitudes, and **(e)** pulse widths and average anodic peak currents (n=3) obtained from differential pulse voltammograms in **(b)** Fig. S3a, **(d)** Fig. S3c, and **(f)** Fig. S3e, respectively.

**The analytical performance of the carbon cotton thread-based sensor.**

****

**Fig. S4 (a)** Differential pulse voltammograms of different concentrations of UA (0−2 mM) on the carbon coated cotton thread-based sensor and **(b)** linear range from 0.1−2.0 mM by measurements using 3 individual single-use electrodes (n=3).

**Stability of AuNPs modified cotton thread-based electrodes.**



**Fig. S5** Stability of AuNPs modified cotton thread-based sensor with different periods after fabrication by measurements with 3 individual single-use electrodes (n=3).

**The analytical performance of the modified sensor in artificial urine samples.**

****

**Fig. S6 (a)** Differential pulse voltammograms of different concentrations of UA in artificial urine (0−3.4 mM) on the modified cotton thread-based sensor and **(b)** linear range from 0.4−3.4 mM by measurements using 3 individual single-use electrode (n=3).

**Table S1** Determination of different concentrations of UA in artificial urine samples using the modified sensor directly integrated on diaper (n=3).

|  |  |  |  |
| --- | --- | --- | --- |
| Spiked UA concentration (mM) | Measured UA concentration (mM) | Recovery  (%) | RSD  (%) |
| 1.0 | 1.05±0.09 | 105 | 8.5 |
| 2.0 | 1.92±0.11 | 96 | 5.7 |
| 3.0 | 3.03±0.09 | 101 | 3.0 |