

Supplementary Materials

# Green Synthesis of Gold Nanoparticles Using Liquiritin and Other Phenolics from Glycyrrhiza Glabra and Their Anti-Inflammatory Activity

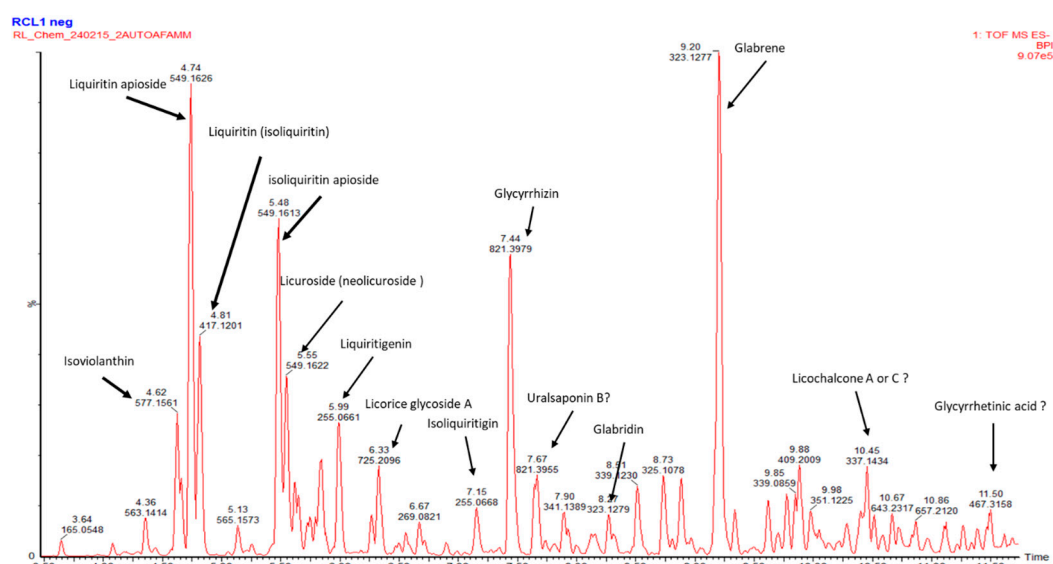
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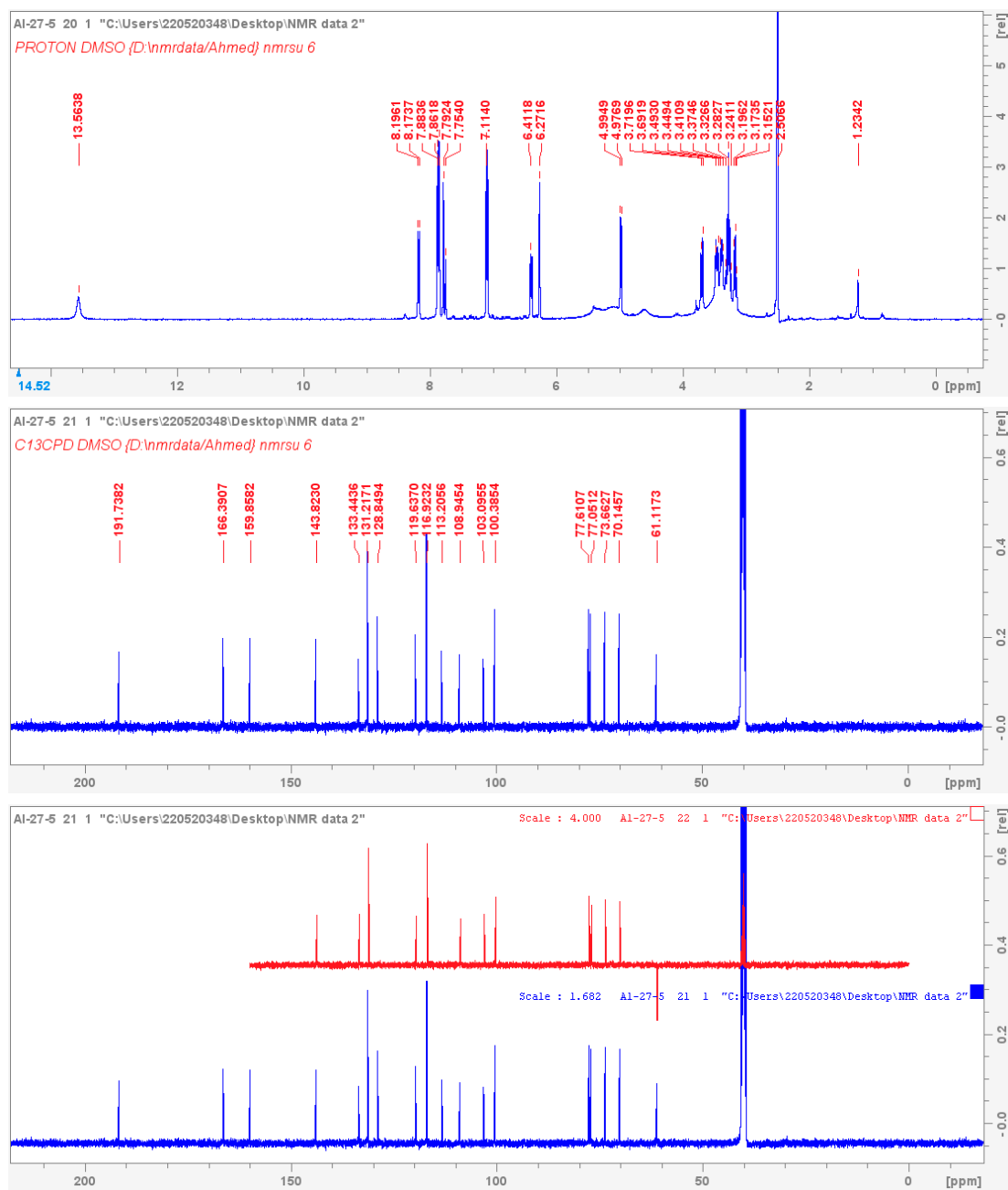
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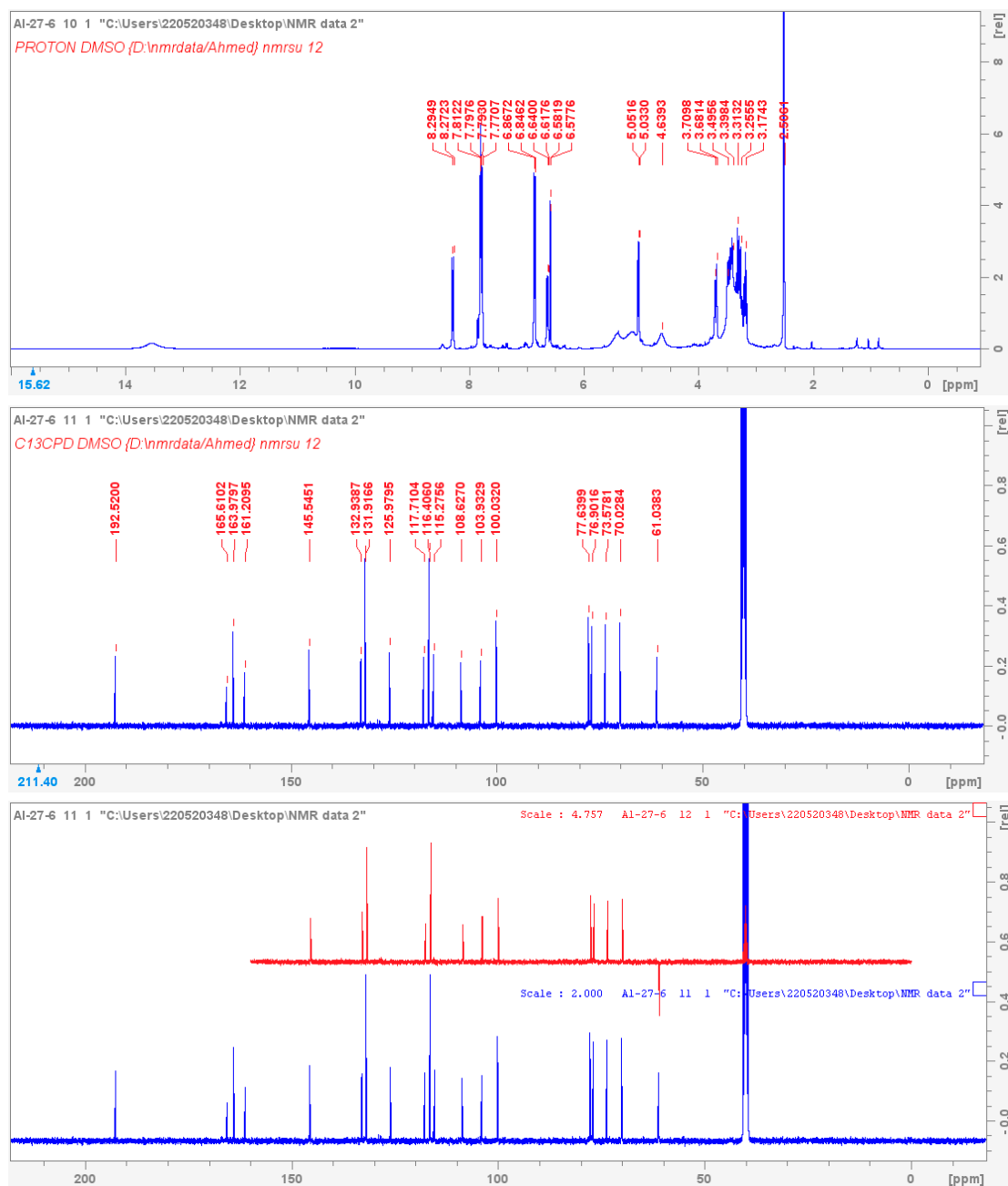
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**Figure S1.** LC-MS chromatogram of the total extract and the tentative identification of the major compounds [90–95].

Figure S2.1. <sup>1</sup>H and <sup>13</sup>C spectra of compound 1.

Figure S2.2. <sup>1</sup>H and <sup>13</sup>C spectra of compound 2.

Figure S2.3. <sup>1</sup>H and <sup>13</sup>C spectra of compound 3.

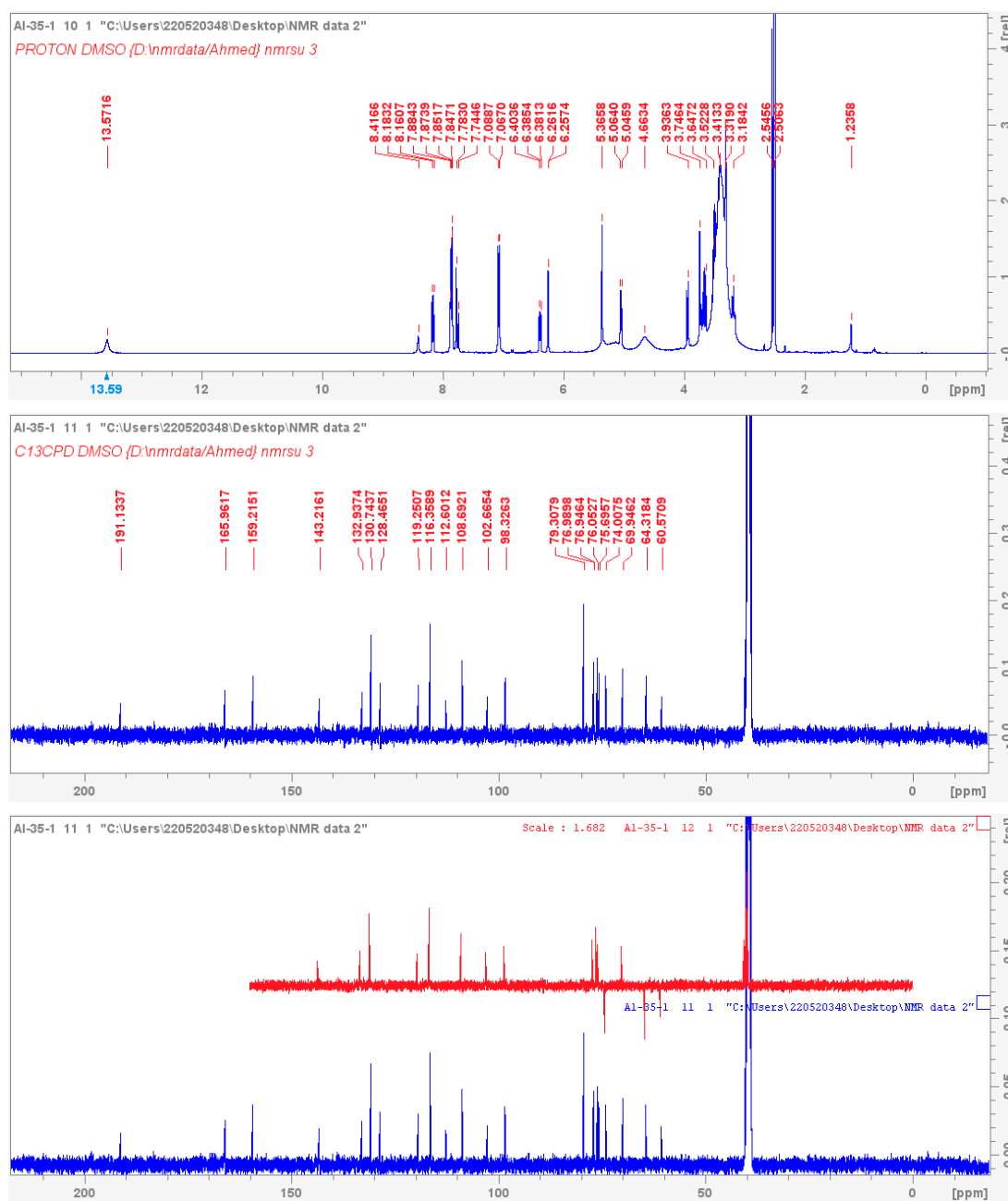
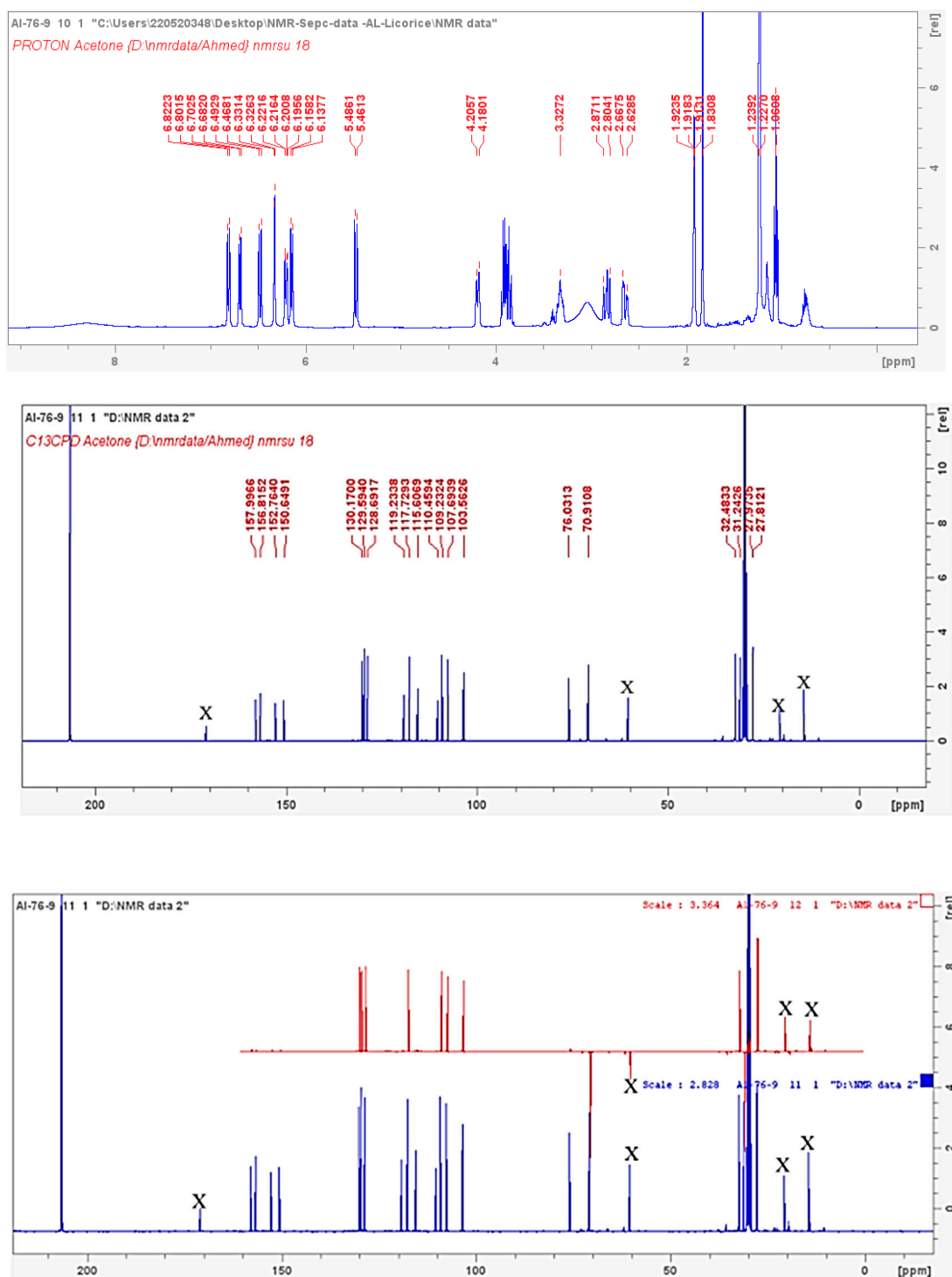
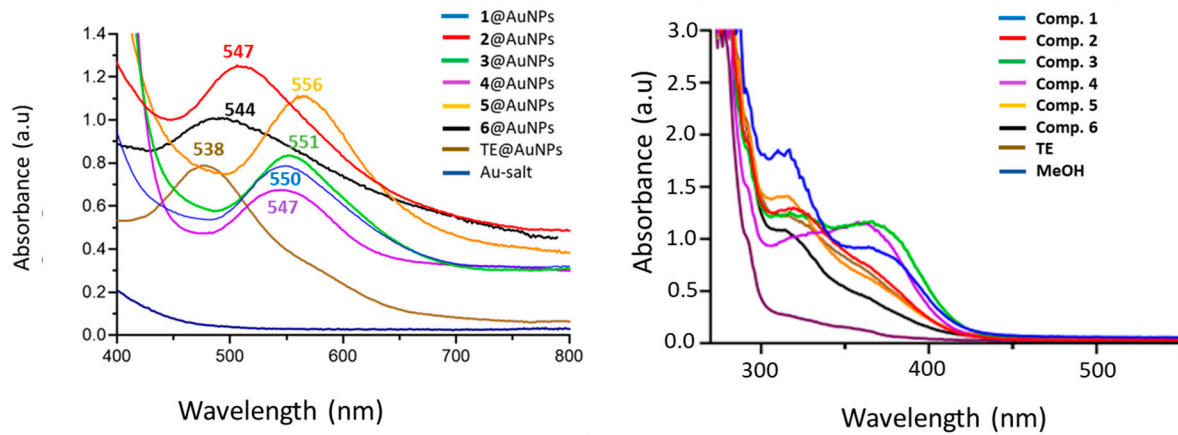
Figure S2.4. <sup>1</sup>H and <sup>13</sup>C spectra of compound 4.

Figure S2.5. <sup>1</sup>H and <sup>13</sup>C spectra of compound 5.



**Figure S2.6.** <sup>1</sup>H and <sup>13</sup>C spectra of compound 6 (the extra signals belong to traces of ethyl acetate).



NPs	Zeta potential	Average Size/PDI
1@AuNPs	<p>Mean (mV)      Area (%)      St Dev (mV)</p> <p><b>Zeta Potential (mV): -29.9</b>      Peak 1: -29.9      100.0      6.10</p> <p>Zeta Deviation (mV): 6.10      Peak 2: 0.00      0.0      0.00</p> <p>Conductivity (mS/cm): 0.226      Peak 3: 0.00      0.0      0.00</p> <p>Result quality: <b>Good</b></p> <p>Record 1893: 27-2.1      Record 1894: 27-2.2      Record 1895: 27-2.3</p>	<p>Size (d.nm):      % Intensity:      St Dev (d.nm):</p> <p><b>Z.Average (d.nm): 194.0</b>      Peak 1: 203.9      100.0      73.08</p> <p>PdI: 0.125      Peak 2: 0.000      0.0      0.000</p> <p>Intercept: 0.946      Peak 3: 0.000      0.0      0.000</p> <p>Result quality: <b>Good</b></p> <p>Record 1888: 27-2.3      Record 1889: 27-2.1</p>
2@AuNPs	<p>Mean (mV)      Area (%)      St Dev (mV)</p> <p><b>Zeta Potential (mV): -20.2</b>      Peak 1: -20.2      100.0      4.15</p> <p>Zeta Deviation (mV): 4.15      Peak 2: 0.00      0.0      0.00</p> <p>Conductivity (mS/cm): 0.463      Peak 3: 0.00      0.0      0.00</p> <p>Result quality: <b>Good</b></p> <p>Record 2018: Comp.2 code (27-5) 1      Record 2019: Comp.2 code (27-5) 2</p> <p>Record 2020: Comp.2 code (27-5) 3</p>	<p>Size (d.nm):      % Intensity:      St Dev (d.nm):</p> <p><b>Z.Average (d.nm): 221.9</b>      Peak 1: 332.3      100.0      247.5</p> <p>PdI: 0.263      Peak 2: 0.000      0.0      0.000</p> <p>Intercept: 0.952      Peak 3: 0.000      0.0      0.000</p> <p>Result quality: <b>Good</b></p> <p>Record 1868: 27-5.1      Record 1869: 27-5.2      Record 1870: 27-5.3</p>
3@AuNPs	<p>Mean (mV)      Area (%)      St Dev (mV)</p> <p><b>Zeta Potential (mV): -32.3</b>      Peak 1: -32.3      100.0      4.14</p> <p>Zeta Deviation (mV): 4.14      Peak 2: 0.00      0.0      0.00</p> <p>Conductivity (mS/cm): 0.337      Peak 3: 0.00      0.0      0.00</p> <p>Result quality: <b>Good</b></p> <p>Record 1926: Compound 3 code (27-6) 1      Record 1927: Compound 3 code (27-6) 2</p> <p>Record 1928: Compound 3 code (27-6) 3</p>	<p>Size (d.nm):      % Intensity:      St Dev (d.nm):</p> <p><b>Z.Average (d.nm): 351.0</b>      Peak 1: 403.7      100.0      156.1</p> <p>PdI: 0.122      Peak 2: 0.000      0.0      0.000</p> <p>Intercept: 0.907      Peak 3: 0.000      0.0      0.000</p> <p>Result quality: <b>Good</b></p> <p>Record 1941: Comp.3 code (27-6) 1      Record 1942: Comp.3 code (27-6) 2</p> <p>Record 1943: Comp.3 code (27-6) 3</p>



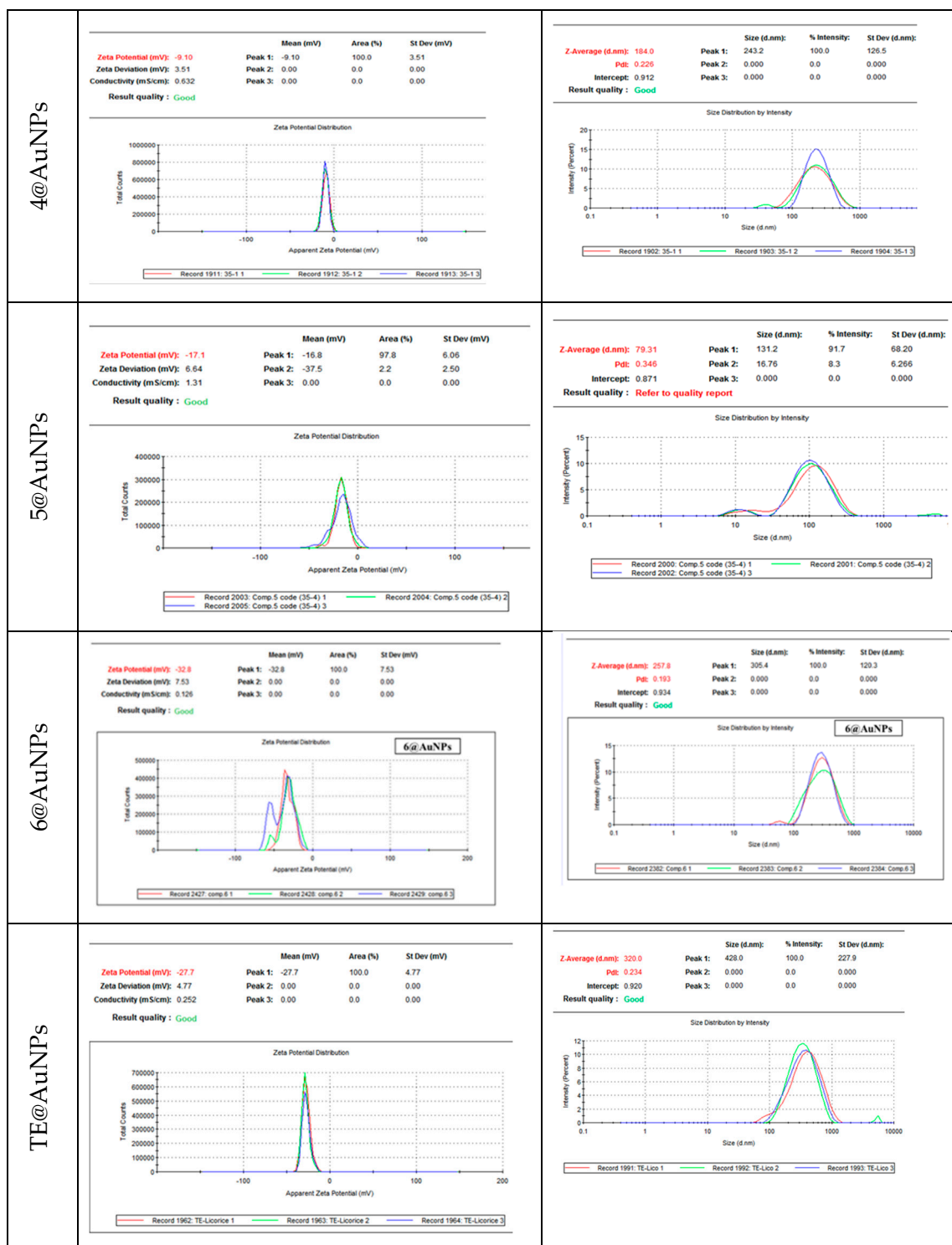


Figure S4. Zeta potential and relative size distribution of the synthesized NPs.

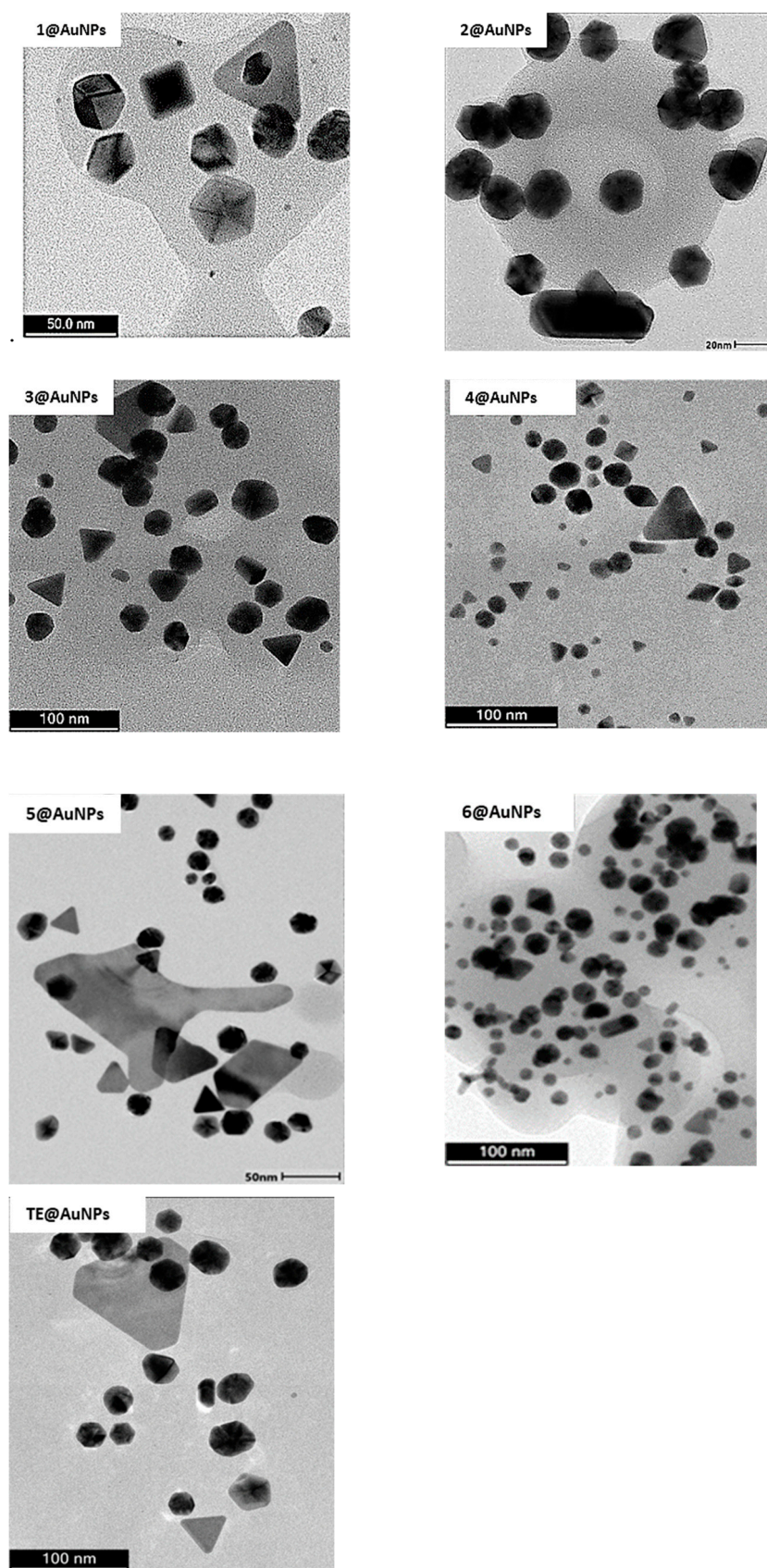
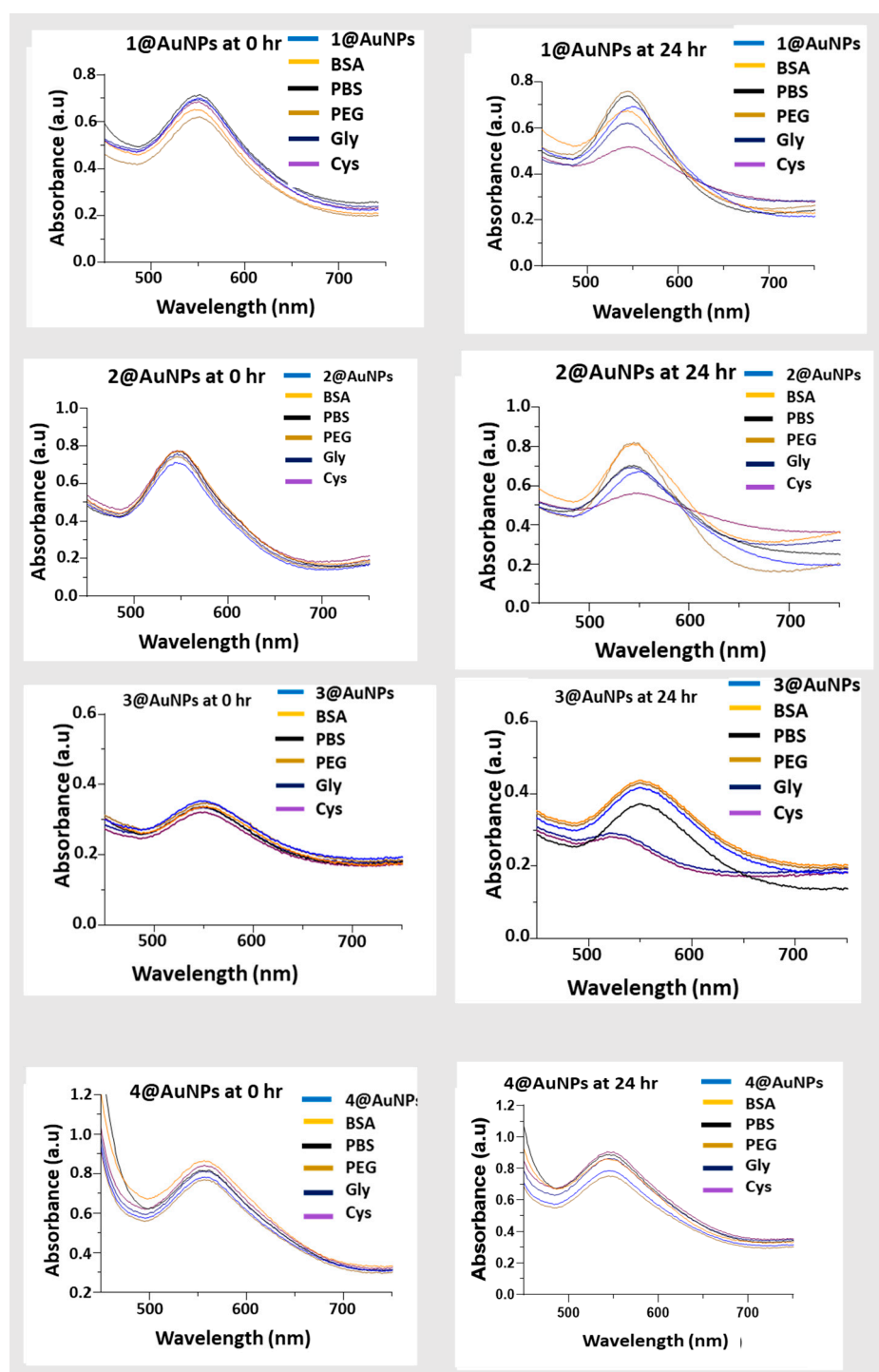


Figure S5. HRTEM of the synthesized AuNPs.



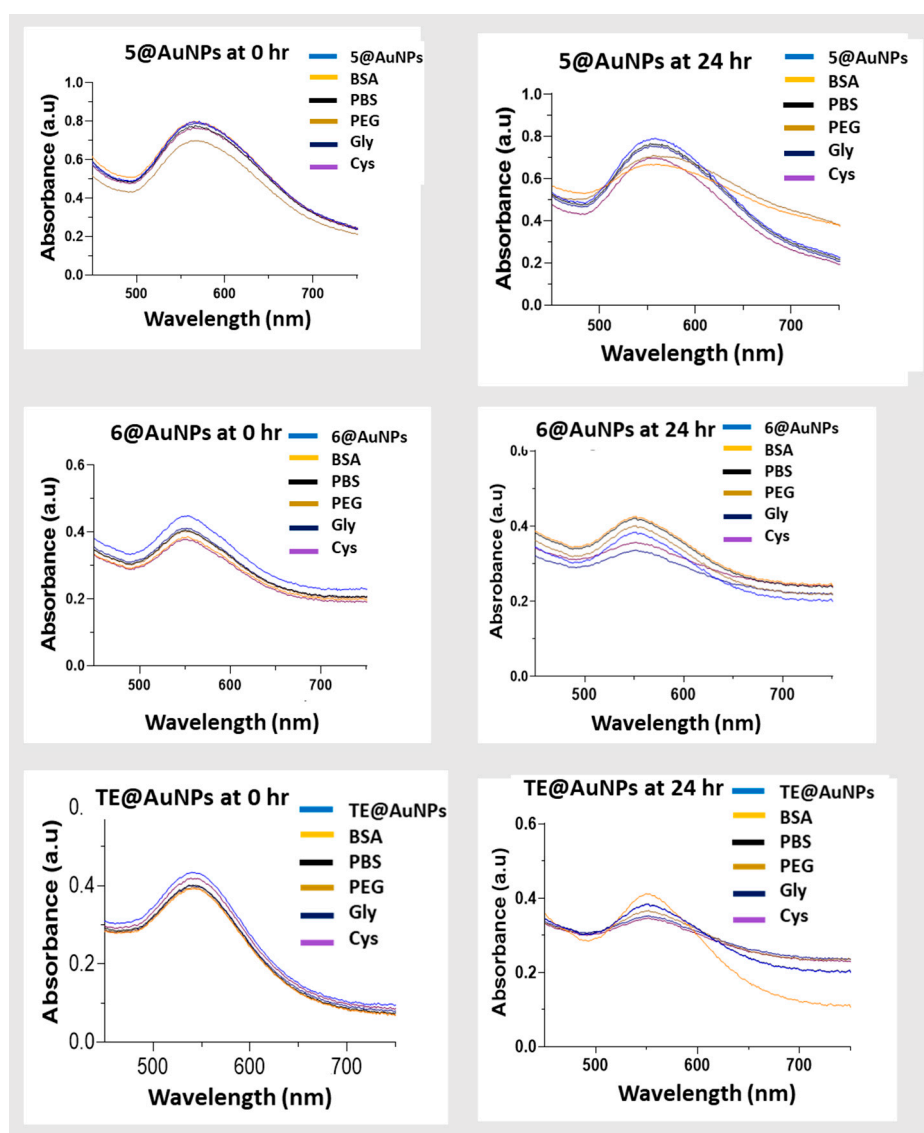


Figure S6. Stability of the AuNP conjugates in different biogenic media after 24 hr.

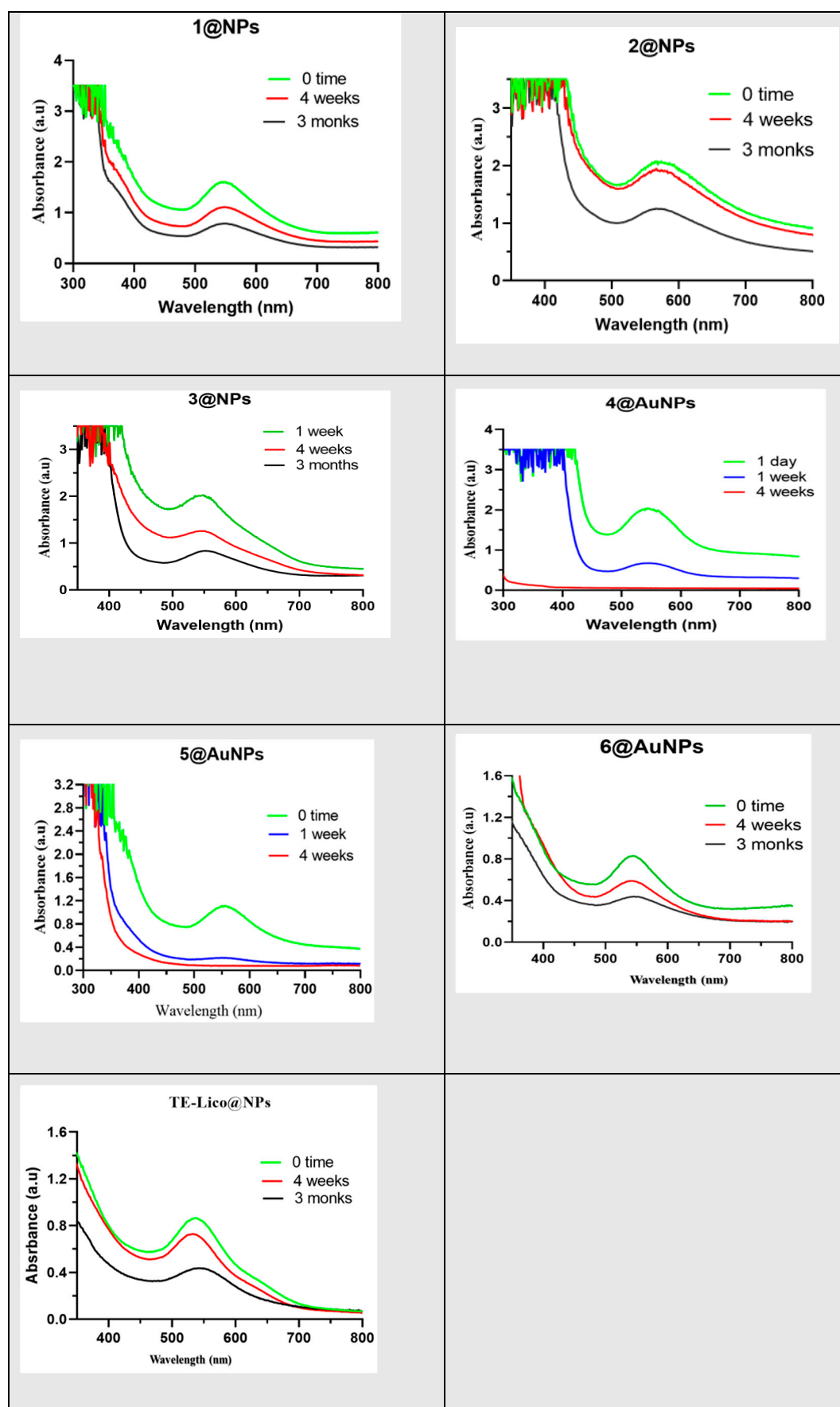
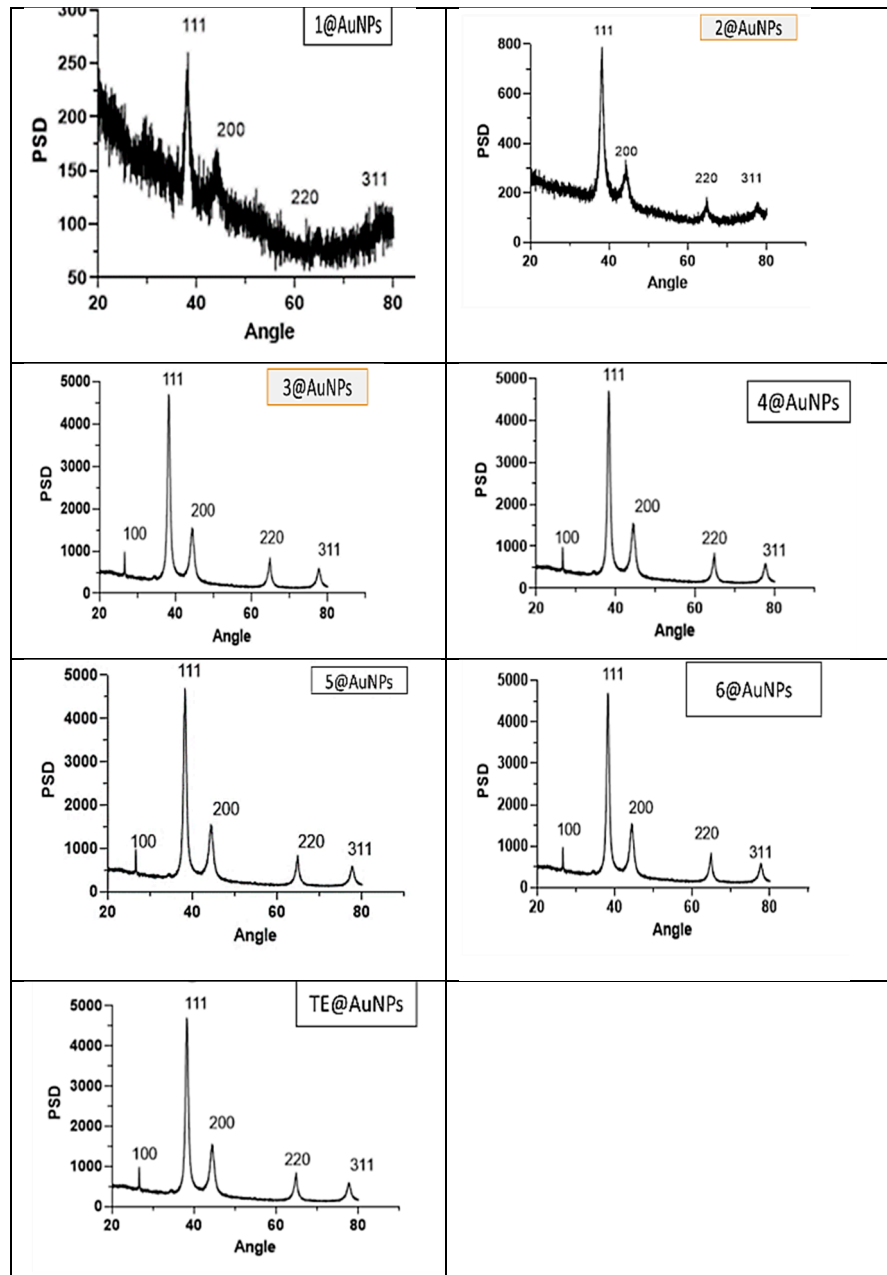


Figure S7. Stability of the AuNP conjugates for three months.





**Figure S8.** XRD of the synthesized AuNPs.

The average size of the particles (Table 1) was calculated using the Scherrer equation:

$$D = \frac{K\lambda}{\beta \cos\theta}$$

Where  $D$  = particle size,  $\lambda$  is the X-ray wavelength;  $\beta$  is the full width at half maximum (FWHM) of the diffraction peak;  $\theta$  is the diffraction angle, and  $K$  is the Scherrer constant).

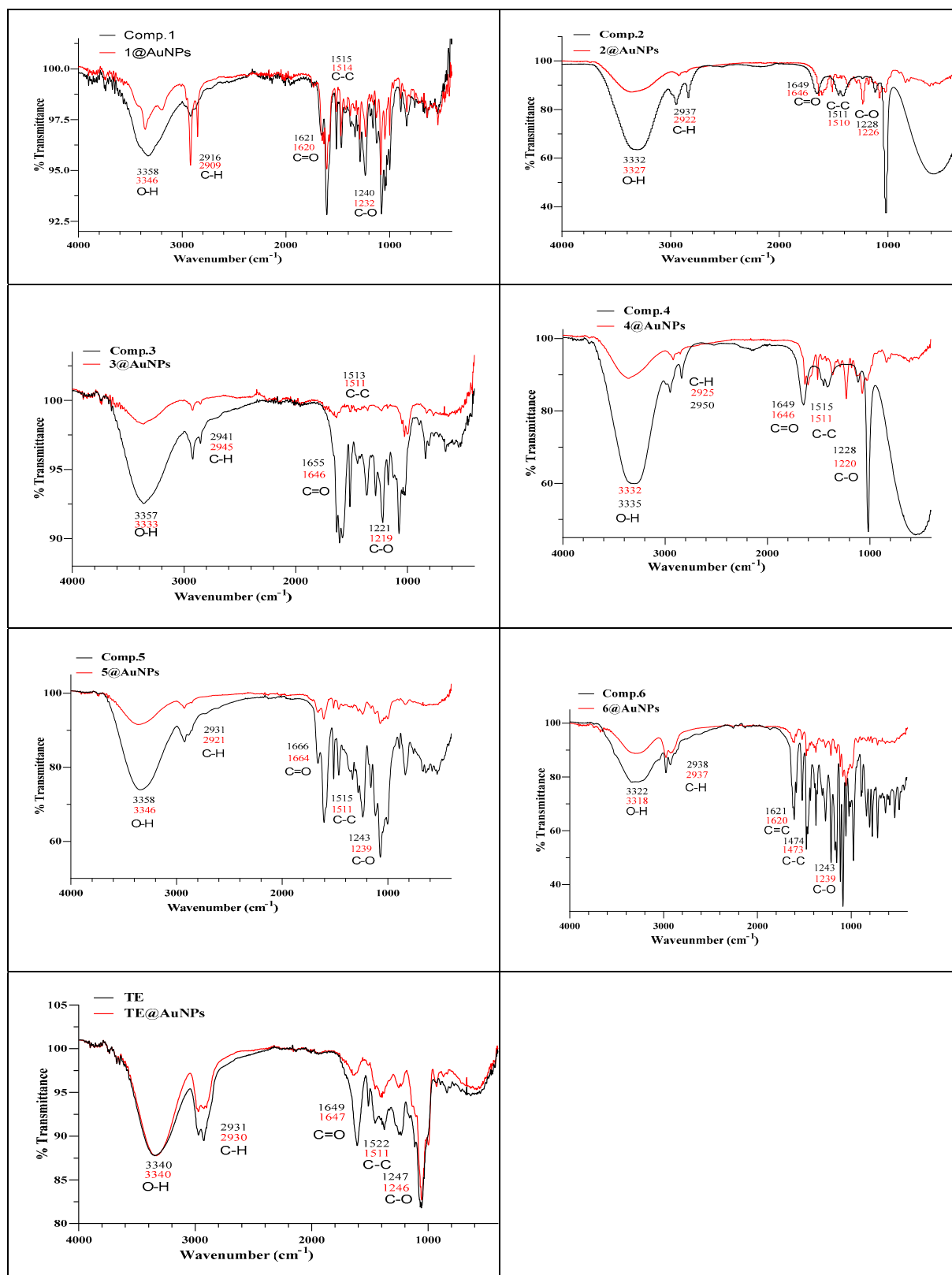
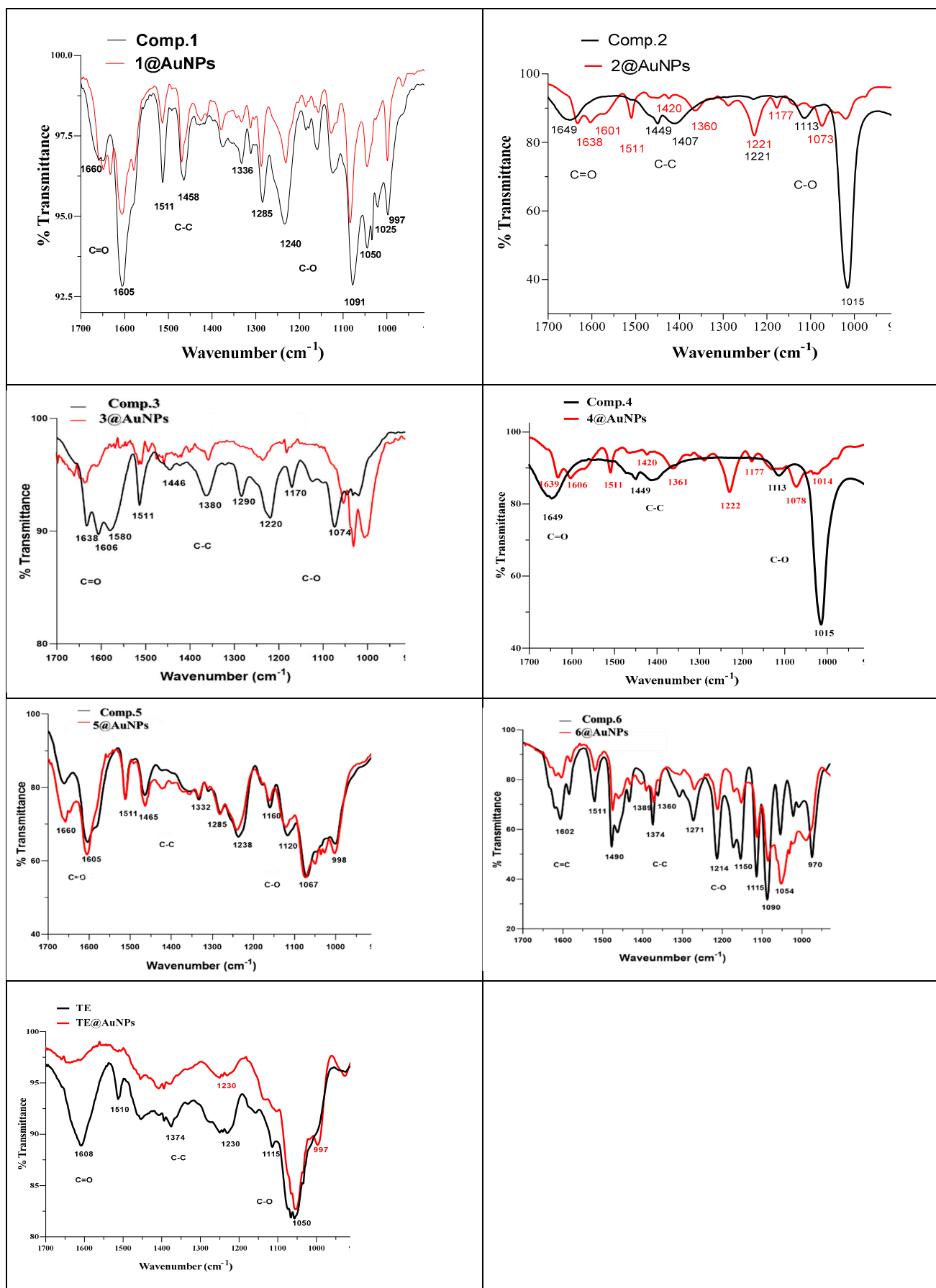


Figure S9. FTIR spectra of the synthesized AuNPs with their intact compounds.





**Figure S10.** FTIR of total extract/pure compounds (black) and their corresponding AuNPs (red) in the 1700-930  $\text{cm}^{-1}$  range.

**Table S1.** The calculation using Scherrer equation\*.

	Peak position	D (size nm)	Average size nm
<u>1@AuNPs</u>	38.09536	7.8765679	<b>6.564237061</b>
	44.1069	5.251906222	
<u>2@AuNPs</u>	38.15768	6.61590384	<b>5.486724806</b>
	44.18007	4.357545772	
<u>3@AuNPs</u>	38.25966	8.499486133	<b>10.01805687</b>
	44.36581	5.430383976	
	64.77982	12.48087356	
	77.70322	13.66148381	
<u>4@AuNPs</u>	38.25966	8.499486133	<b>9.248090944</b>
	44.3658	8.672004152	
	64.77982	9.509615469	
	77.70323	10.31125802	
<u>5@AuNPs</u>	38.25959	8.539102328	<b>10.05736089</b>
	44.36605	5.441996866	
	64.7802	12.54647926	
	77.70334	13.70186509	
<u>6@AuNPs</u>	38.25966	8.499486133	<b>10.01798554</b>
	44.3658	5.430280668	
	64.77982	12.48087356	
	77.70323	13.66130181	
<u>TE@AuNPs</u>	64.7802	12.54647926	<b>10.05739385</b>
	38.25959	8.539015613	
	44.36605	5.442031386	
	77.70334	13.70204914	

\*the calculation was made using Origin software.