Supplementary Information

Poly(thionine) modified screen-printed electrodes for CA19-9 detection and its properties in Raman spectroscopy

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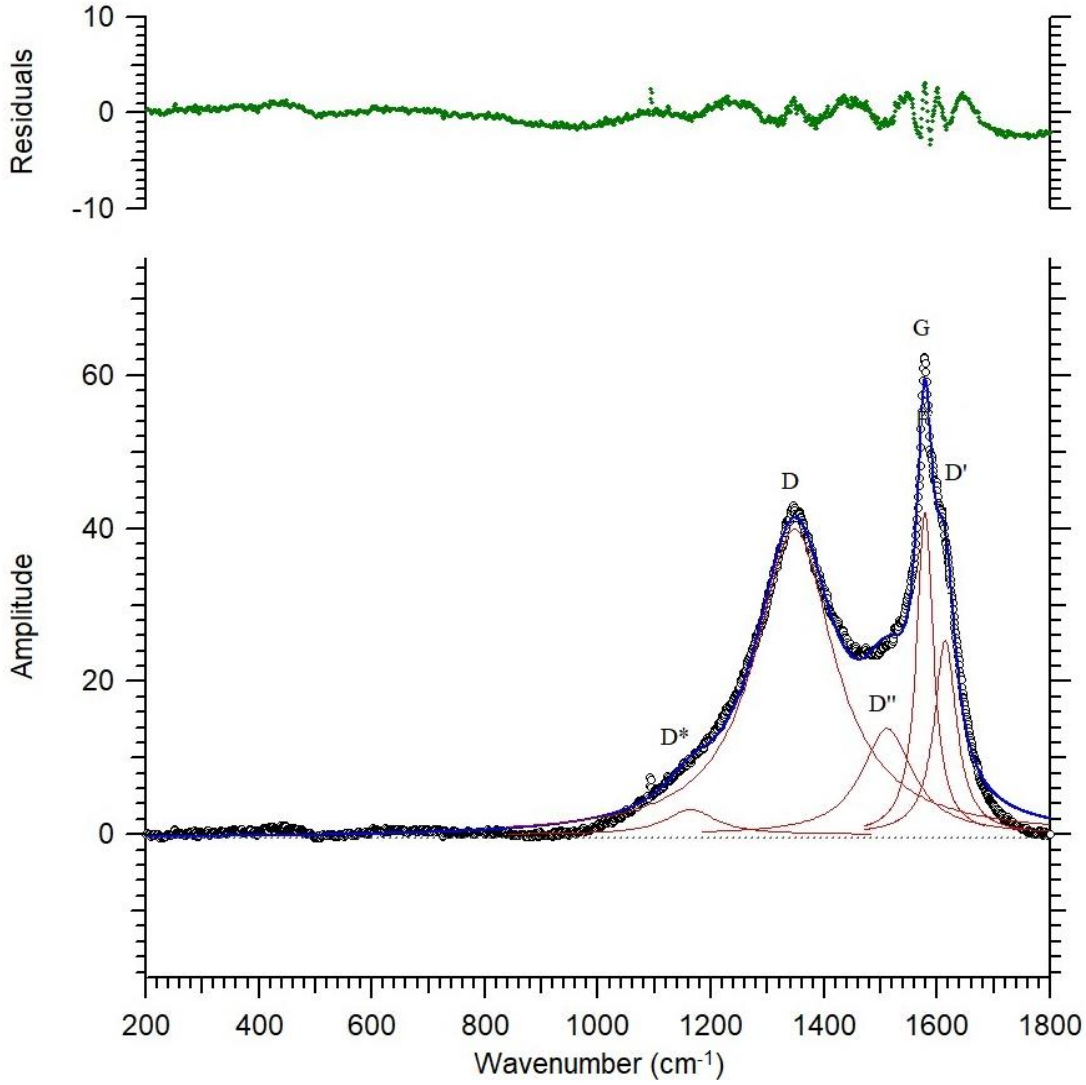

Figure S1. Raman spectra of the carbon electrode at room temperature, signaling peaks G, D, D', D'' and D*.

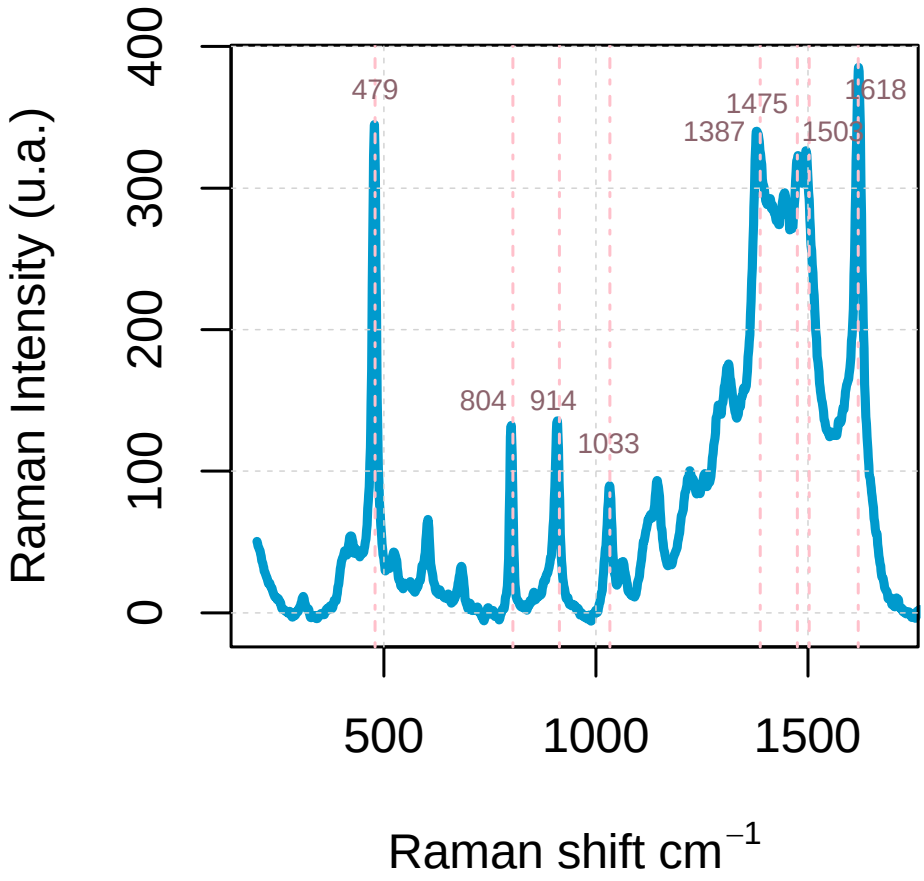

Figure S2: SERS spectra of TH powder showing the most relevant peaks.

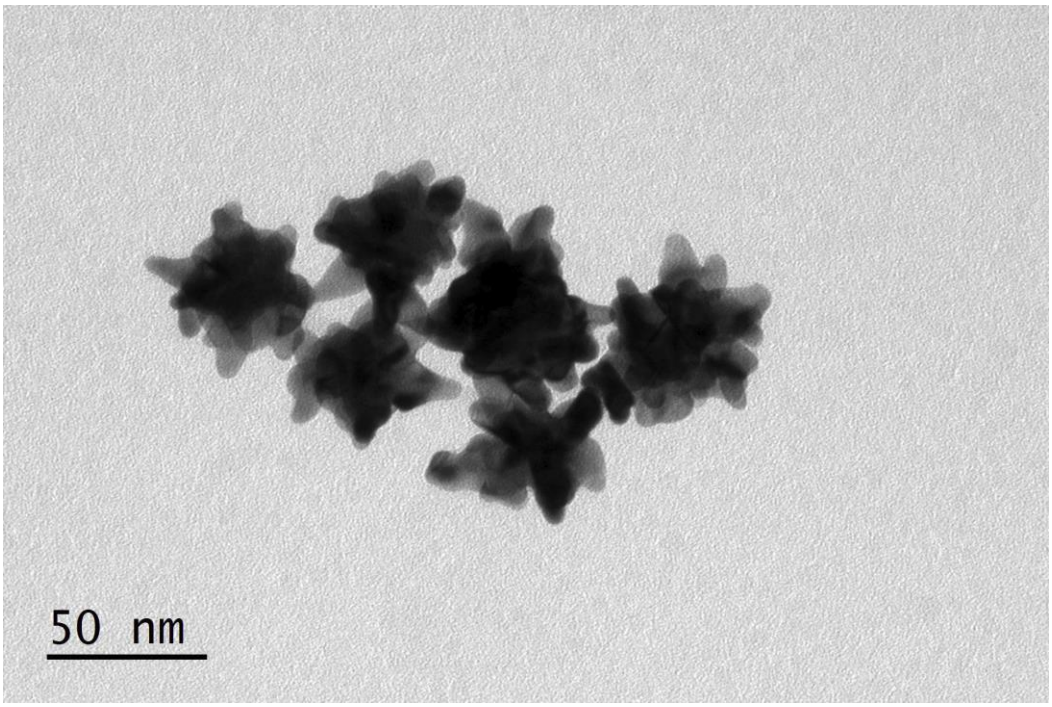

Figure S3. TEM images of AuNS.

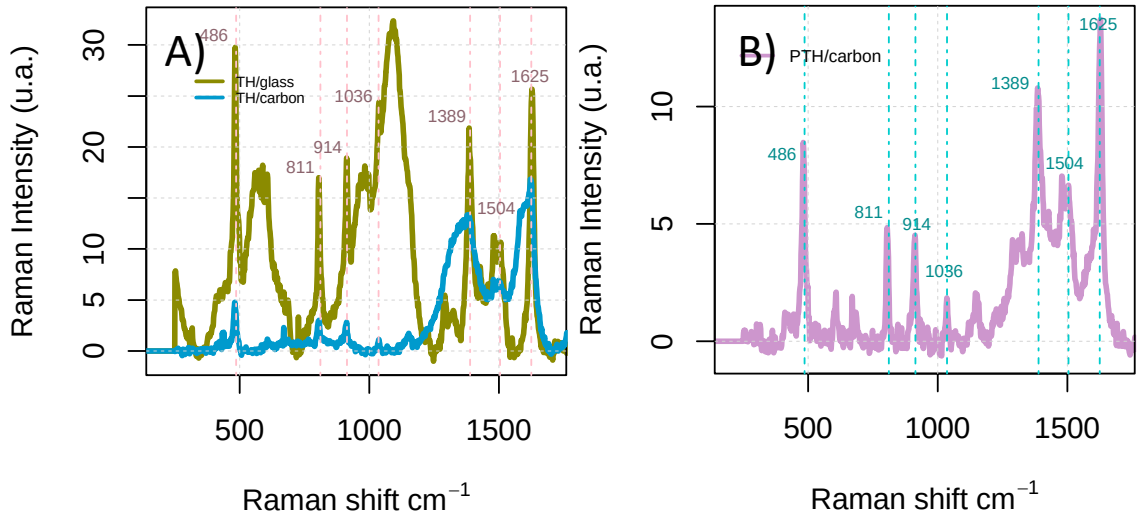

Figure S4. Raman spectra of TH, A) (blue) on carbon electrodes and (green) on glass, both substrates drops with TH, B) (pink) spectra of PTH on carbon substrate.

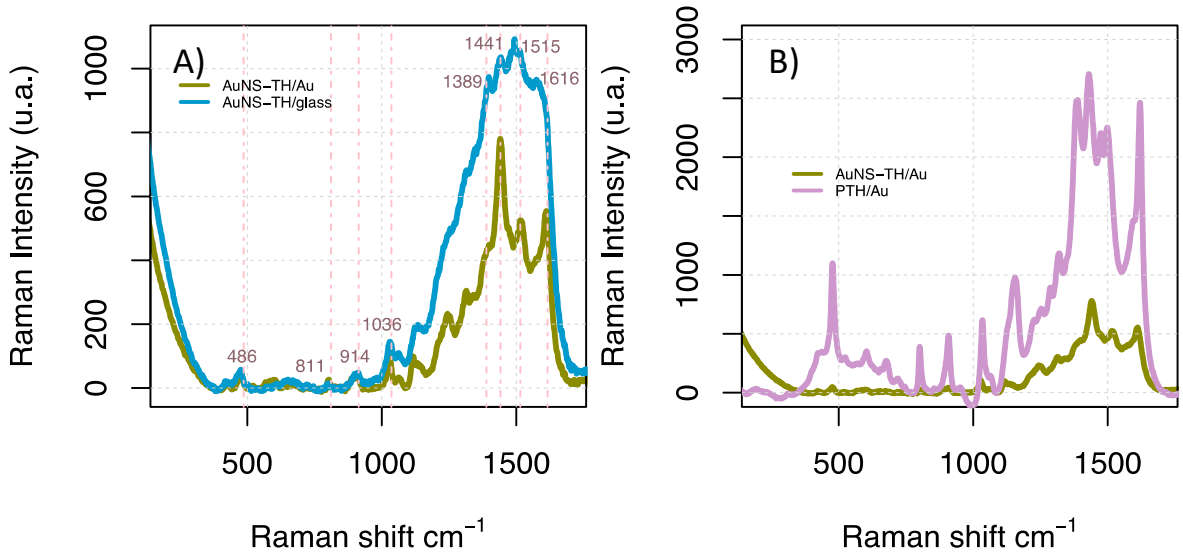

Figure S5. SERS spectra of A) TH/AuNS, (blue) on glass and (green) on gold, B) (pink) spectra of PTH on gold substrate.

Table S1: Information about ratio between intensities and amplitude of carbon bands, D, D'', and G.

Carbon band	Frequency (cm^{-1})	Intensity, I (a.u)	FWHM (cm^{-1})	Area (A)	$I_{D''}/I_G$	$A_{D''}/A_G$	I_D/I_G	A_D/A_G
D	1350	39,76	169,34	10575,5				
D''	1512	13,84	109,22	2374,9				
G	1579	42,04	35,73	2359,7				
					0,33	1,01	0,94	4,48
Carbon+TH band	Frequency (cm^{-1})	Intensity (I) (a.u)	FWHM (cm^{-1})	Area (A)	$I_{D''}/I_G$	$A_{D''}/A_G$	I_D/I_G	A_D/A_G
D	1350	72,68	190,68	21769,3				
D''	1504	30,62	101,12	4871,44				
G	1580	70,18	44,79	4937,025				
					0,43	0,99	1,04	4,41