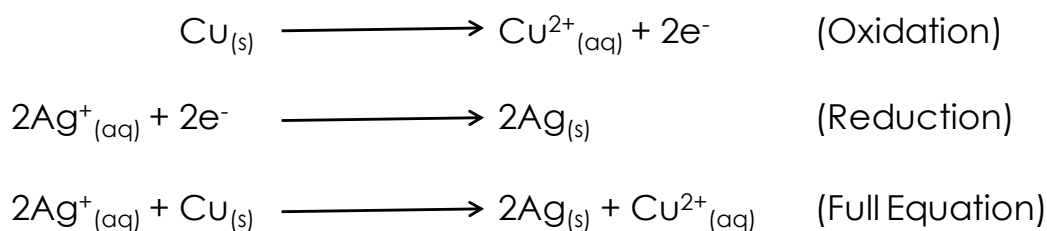


SUPPLEMENTARY INFORMATION

The optimisation of facile substrates for surface enhanced Raman scattering through galvanic replacement of silver onto copper.

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Scheme S1. The galvanic displacement of silver solution onto solid copper proceeds according to the redox reaction displayed. The silver is in solution because the electrode potential of the metal is more positive than that of the copper. It is essential that the reaction be constructed in this way for deposition to proceed.

Table S1. Estimates of elemental composition from EDX analysis for the SoC substrates.

Variation of Deposition time and temperature	Weight of elements (%)		
	Ag	Cu	O
20 s, RT	36.7	62.0	1.3
30 s, RT	32.5	65.0	2.4
20 s, 100°C	36.9	61.8	1.3

Table S2. Summary of the results from the colloidal-based SERS analysis of R6G at different concentration in solution. The mean peak area, standard deviation and %RSD have been calculated for each peak of interest.

	10 ⁻⁴ M			10 ⁻⁵ M			10 ⁻⁶ M		
	Mean	SD	%RSD	Mean	SD	%RSD	Mean	SD	%RSD
Peak 1	139290.7	2690.1	1.9	60827.6	4242.2	6.9	9529.6	684.3	7.2
Peak 2	40732.2	1088.3	2.7	16393.7	1074.9	6.6	2520.9	35.9	1.4
Peak 3	114966.1	4870.7	4.2	101013.2	6860.5	6.8	15930.1	834.7	5.2
Peak 4	95017.5	3946.4	4.1	60381.2	4732.6	7.9	10163.0	515.4	5.1
Peak 5	110361.7	3752.3	3.4	46369.4	3447.1	7.4	8546.7	349.6	4.1
Peak 6	92882.0	4206.8	4.5	45088.1	3198.5	7.1	8111.5	465.3	5.7
	10 ⁻⁷ M			10 ⁻⁸ M			10 ⁻⁹ M		
	Mean	SD	%RSD	Mean	SD	%RSD	Mean	SD	%RSD
Peak 1	934.5	208.7	22.3	188.0	97.8	52.01	327.2	106.7	32.6
Peak 2	-48.6	44.4	-91.6	-185.8	94.3	-50.78	-191.3	59.6	-31.3
Peak 3	-523.4	285.8	-54.6	-1354.6	82.3	-6.07	-1394.8	128.6	-9.2
Peak 4	608.6	205.2	33.7	-1.73	183.1	-	-74.9	94.3	-125.8
Peak 5	585.0	129.7	22.4	148.5	76.6	51.6	165.1	156.2	94.6
Peak 6	636.1	91.3	14.3	17.5	33.5	192.1	-20.9	95.0	-454.0

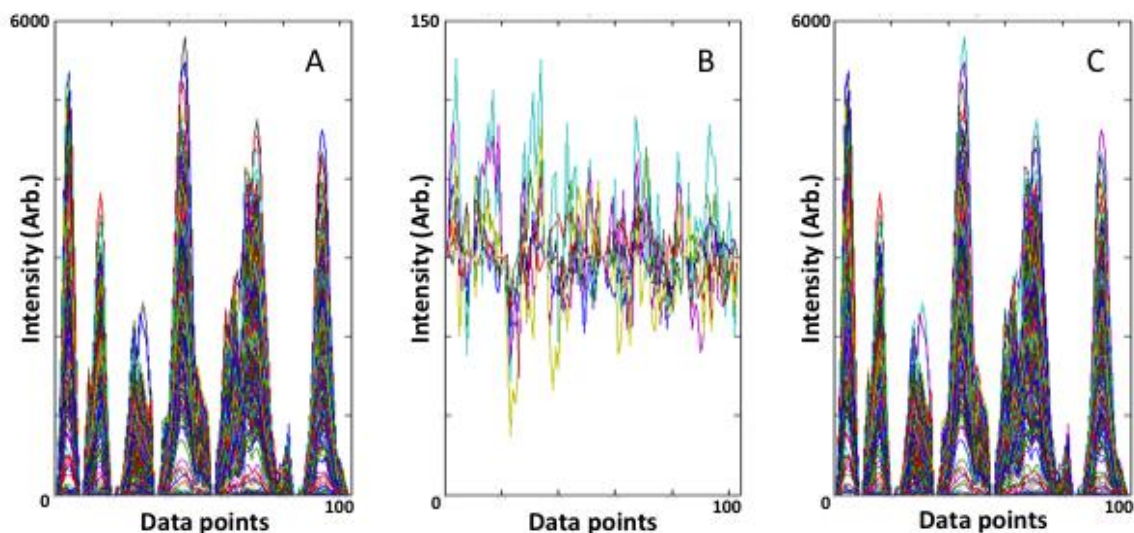


Figure S1. Illustration of morphological scores filter for removing non-R6G SERS spectra from the data set. (A) The complete unfiltered data set, (B) the noise that is filtered out using a threshold of $MS < 2$, and (C) the result of noise removal when a MS of > 2 is applied.

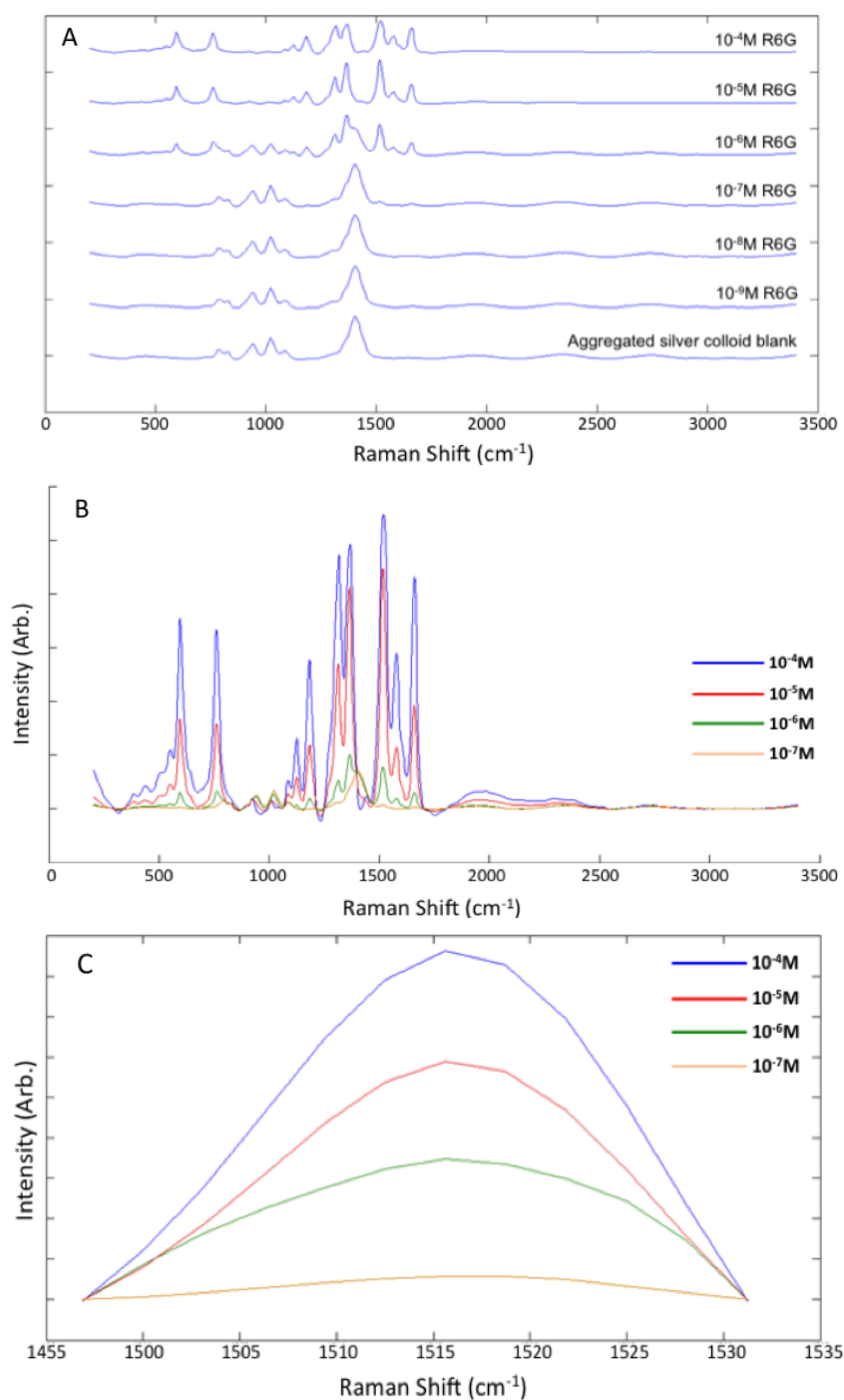


Figure S2: (A) Staggered plot showing the colloidal-based SERS spectra of R6G at concentrations spanning from $1 \times 10^{-4} \text{M}$ to $1 \times 10^{-9} \text{M}$ including a blank of the aggregated silver sol. (B) Overlaid spectra showing the SERS spectra of R6G with the lower concentrations of $1 \times 10^{-8} \text{M}$, $1 \times 10^{-9} \text{M}$ and aggregated silver sol removed, this shows how the signal arising from R6G is reduced at lower concentrations. (C) Single extracted peak shows a clear quantitative trend with decreasing analyte concentration. The area of the extracted single peaks is used to generate Table S2.