Critical Assessment of Wet-chemical Oxidation Synthesis of Silicon Quantum Dots

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1. Elemental analysis of Si QDs and Control

Table S1. Elemental composition of **Si QDs** and **Control**.

	Bromine (%)	Carbon (%)	Silicon (%)
Si QDs (18 h)	6.5	61.2	2.1
Si QDs (60 h)	3.9	64.3	2.2
Control	11.2	69.7	0.4

2. XPS data Si QDs and Control

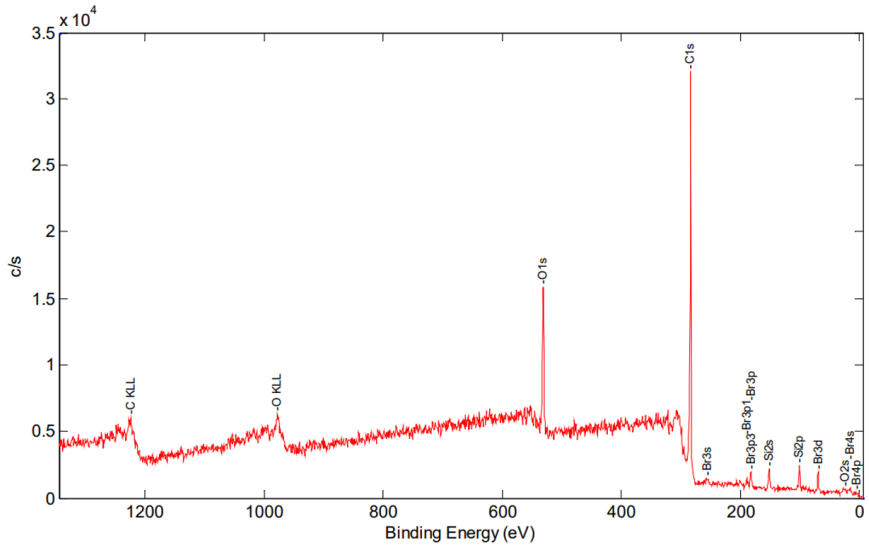

Figure S1. Wide-scan spectrum XPS of **Si QDs**.

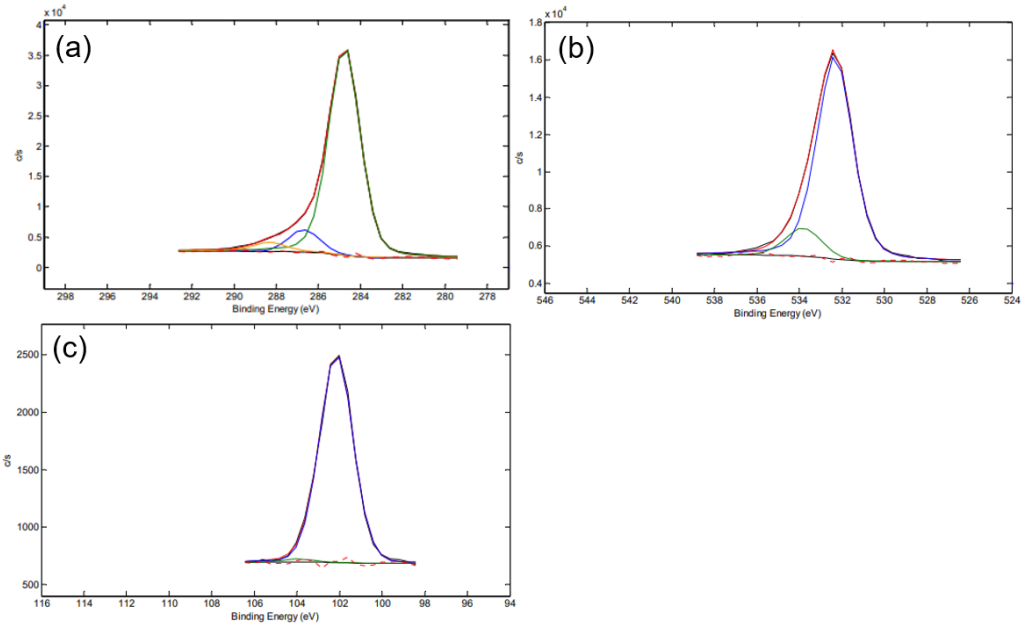

Figure S2. Deconvoluted C 1s (a), O 1s (b), and Si 2p (c) XPS spectra for **Si QDs**.

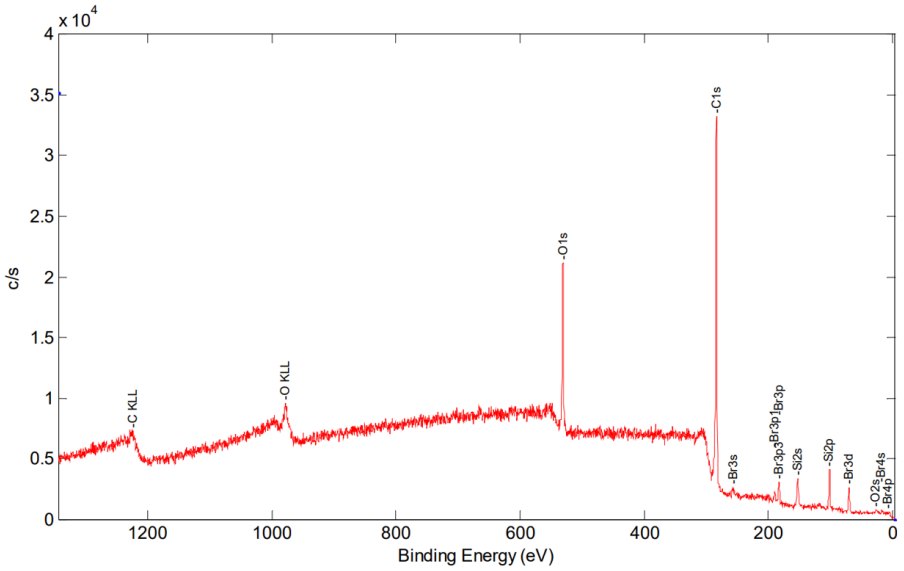

Figure S3. Wide-scan spectrum XPS of **Control**.

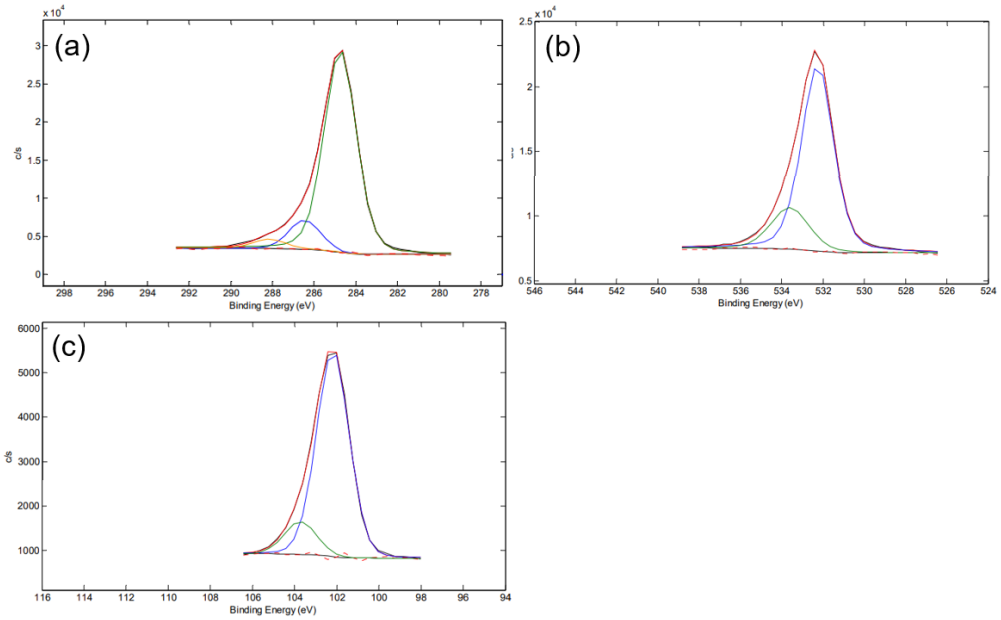

Figure S4. deconvoluted C 1s (a), O 1s (b), and Si 2p (c) XPS spectra for the **Control**.

3. Comparison between Si QDs for 18 h and 60 h reaction duration

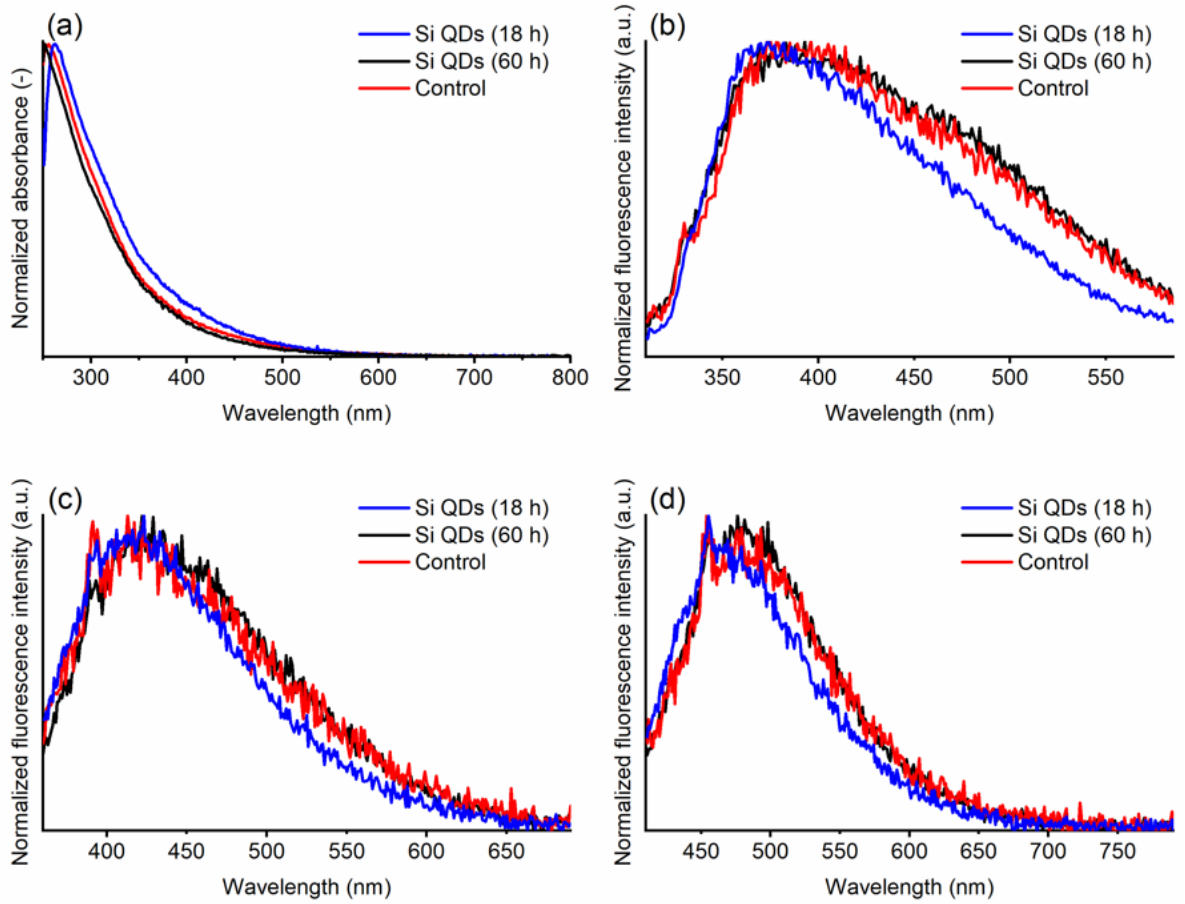

Figure S5. Absorbance (a) and emission of **Si QDs** (18 and 60 h), and the **Control** for excitation at 300 (b), 350 (c) and 400 nm (d), respectively.

4. Quantum yield calculation

Quantum yield can be calculated by applying Equation 1.[1]

$$Q = Q_R * \frac{I}{I_R} * \frac{OD_R}{OD} * \frac{n^2}{n_R^2} \quad (1)$$

Q is the quantum yield, I the integrated fluorescence intensity, OD the optical density (i.e. absorbance), and n the refractive index. The subscript R refers to the reference. For quantum yield determination, 9,10-diphenylanthracene (9,10-DPA) in ethanol was chosen as reference, with a quantum yield of approximately 95%.[2]

5. Full SEC traces with absorbance and fluorescence of Si QDs and Control

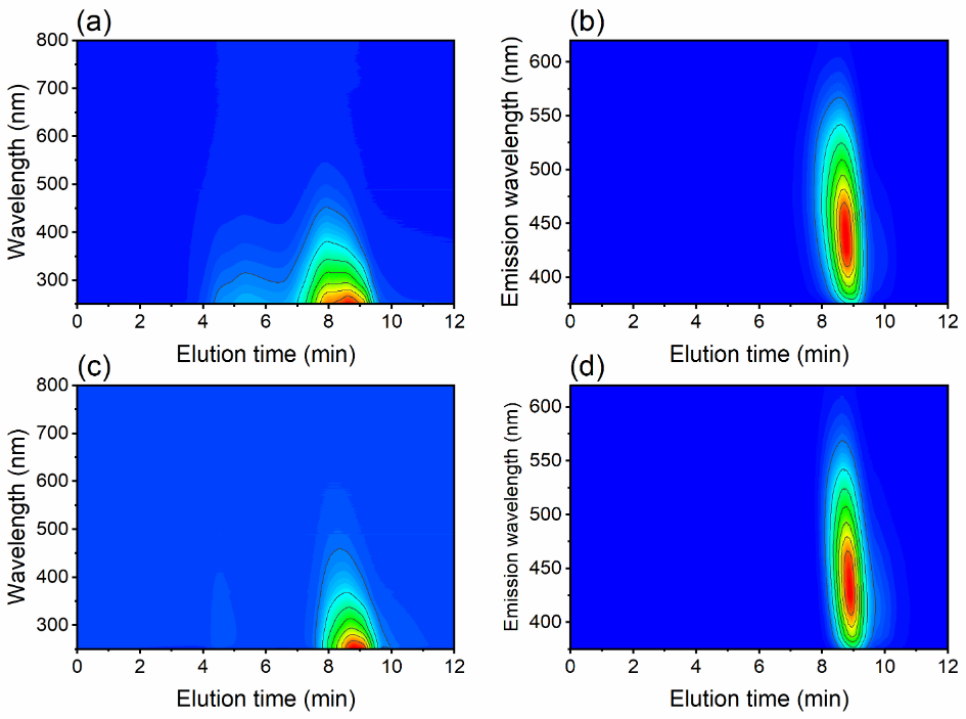

Figure S6. Full SEC trace of **Si QDs** with absorbance (a) and fluorescence (b), and trace of **Control** with absorbance (c) and fluorescence (d).

6. Absorbance SEC traces of Si QDs and Control

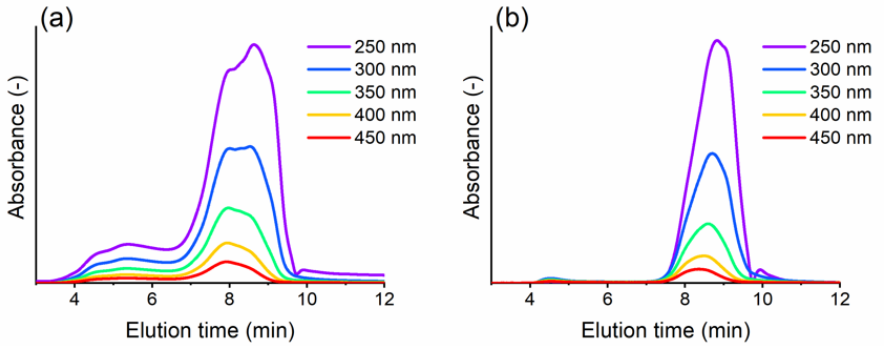

Figure S7. SEC trace with absorbance of **Si QDs** (a) and the **Control** (b) at wavelengths from 250-450 nm.

7. ^{1}H NMR spectroscopy of brominated n-octane

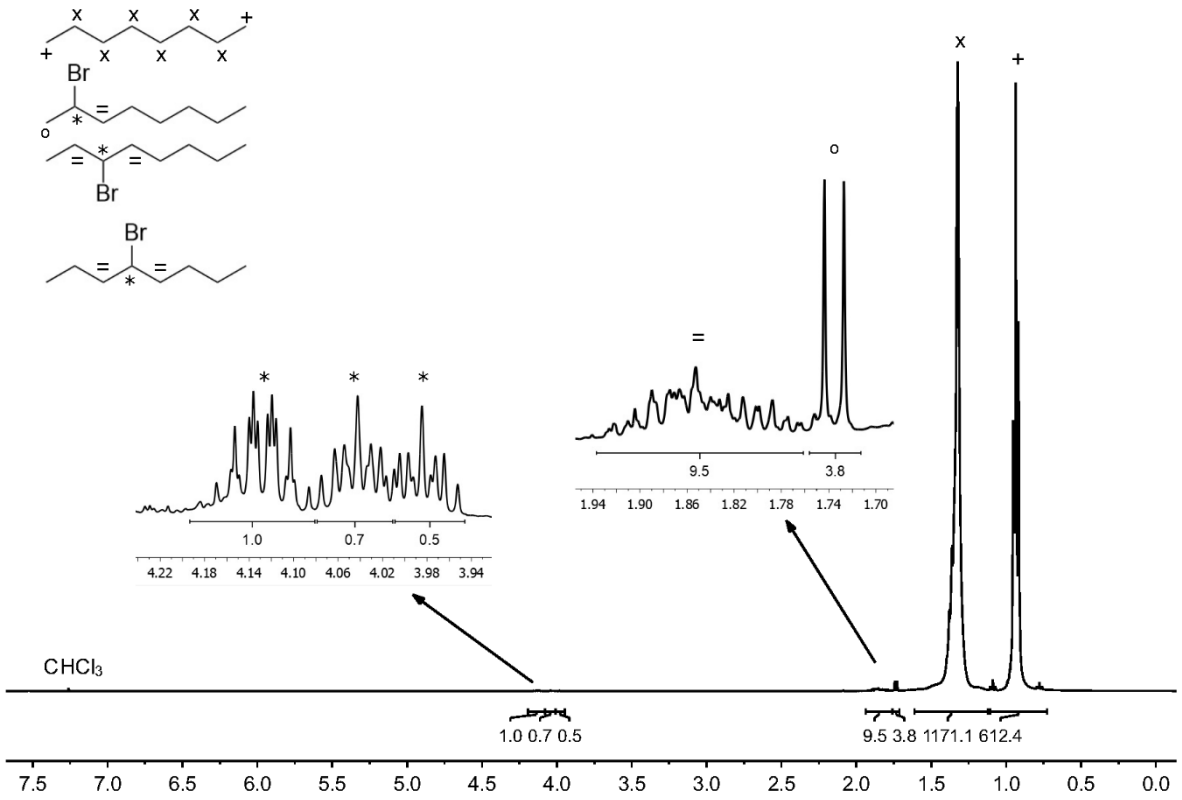

Figure S8. ^{1}H NMR spectroscopy upon bromination of n-octane in chloroform-d.

Integration of peaks denoted with (*) and (=,o) do not match entirely, due to baseline drifting caused by a high n-octane concentration. As a result, integrations of the latter peaks were overestimated.

References

1. J. R. Lakowicz, *Principles of fluorescence spectroscopy*, Springer Science & Business Media, 2013.
2. J. V. Morris, M. A. Mahaney and J. R. Huber, *Journal of Physical Chemistry*, 1976, **80**, 969-974.