

Supporting information

S1- TEM image of cross-section of annealed in-HSQ-MIBK layer on silicon substrate

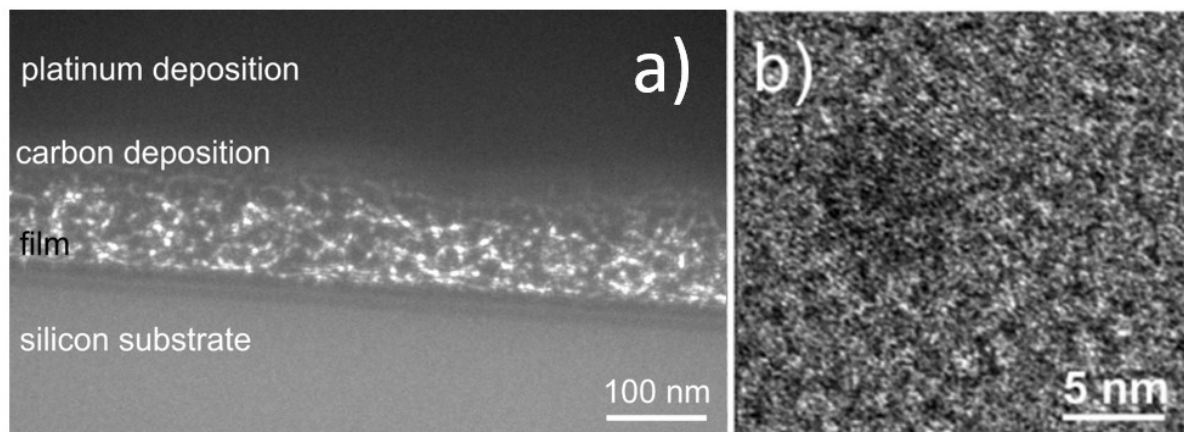


Figure S1: a) TEM image of cross-section of annealed in-HSQ-MIBK layer on silicon substrate, b) TEM detail of one Si-NCs released from in-HSQ-MIBK

S2 FTIR study of HSQ and in-HSQ-MIBK

The annealed in-HSQ-MIBK shares the same peaks as annealed c-HSQ (dashed line I.) belonging to the Si-O cage structure of HSQ. In annealed and non-annealed in-HSQ-MIBK are apparent modifications due to presence of MIBK (dashed line II., IV.). Si-H group is present in both non-annealed c-HSQ and in-HSQ-MIBK and disappears in annealed forms (dashed line III.).

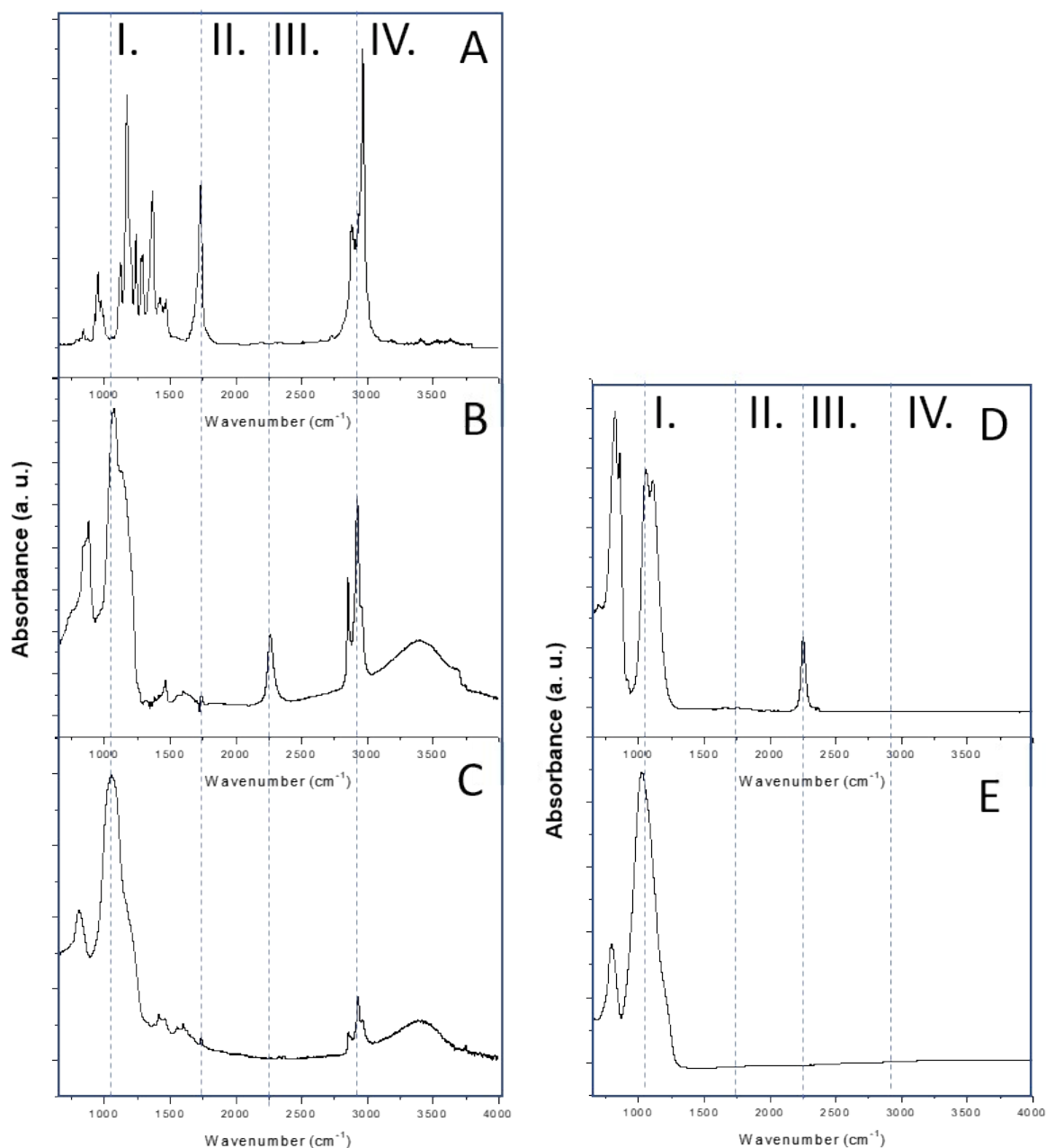


Figure S2: FTIR spectra of A) MIBK pure solution, B) in-HSQ-MIBK before annealing, C) in-HSQ-MIBK after thermal annealing, D) standard c-HSQ before annealing, E) standard c-HSQ after annealing.

S3 FTIR spectra of in-HSQ-Acetone

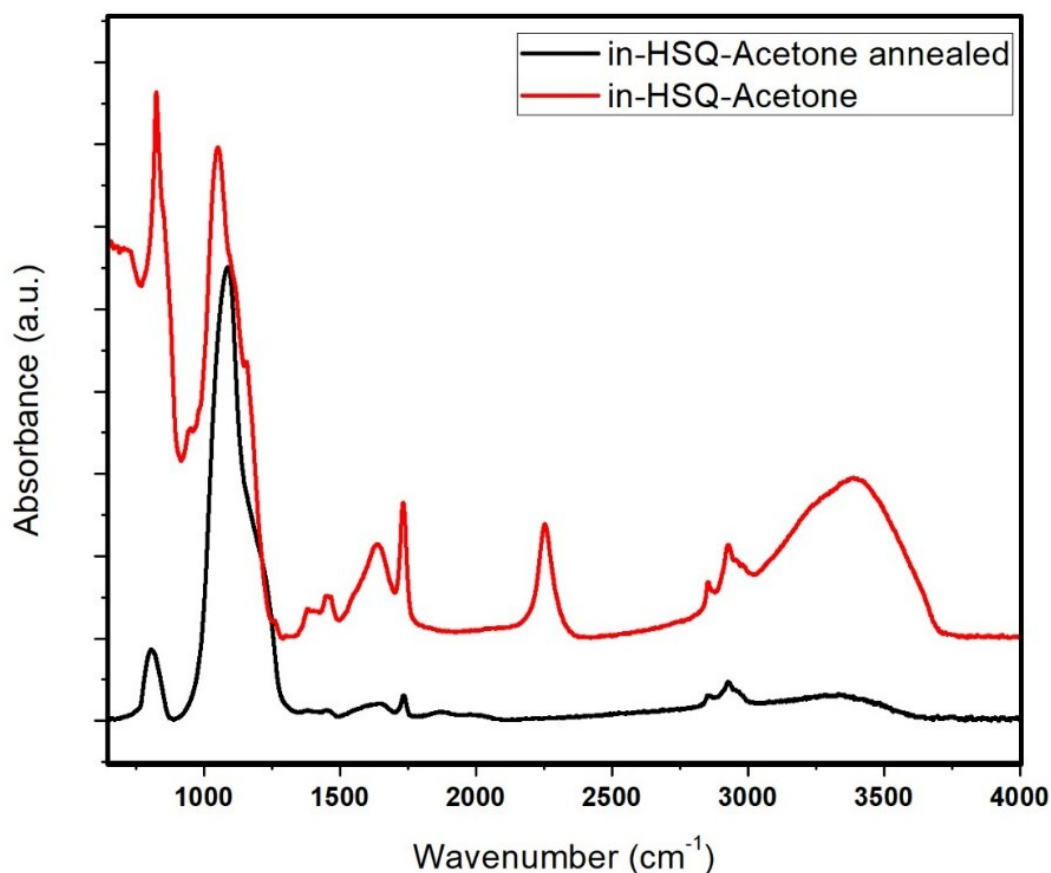


Figure S3: FTIR spectra of in-HSQ-Acetone before annealing (red line) and after annealing (black line)

The organic character of in-HSQ-Acetone was preserved after the annealing. The FTIR frequencies belonging to the HSQ molecule are preserved after modification. The interesting spectral zone is from 1200-1740 cm⁻¹. The peak 1380 cm⁻¹ could be assigned to a sym. deformation vibration of C-H and the peak around 1450cm⁻¹ to C-H asym. deformation vibration whereas the next bond is an ketone for both peaks. The peak around 1635 cm⁻¹ is typical for C=C stretching vibration. Most importantly the peak tentatively assigned to Si-O-C(=O)-CH₃ in non-annealed form of in-HSQ-Acetone has wavenumber of the 1730 cm⁻¹ and in annealed form 1735 cm⁻¹, whereas in pure acetone the bond -(C=O)- has wavenumber of 1750 cm⁻¹. The peak around 3400 cm⁻¹ which is typical for -OH groups is probably result of acetone bonding to or changing the HSQ polymer.

The FTIR peak around 3400 cm⁻¹ is assigned to bond -(C=O)- stretching vibrations overtone, whereas the 3 peaks around 3000 cm⁻¹ are typical for -CH_x bonds according to the literature.

S4 FTIR spectra of in-HSQ-Ethyl-acetate

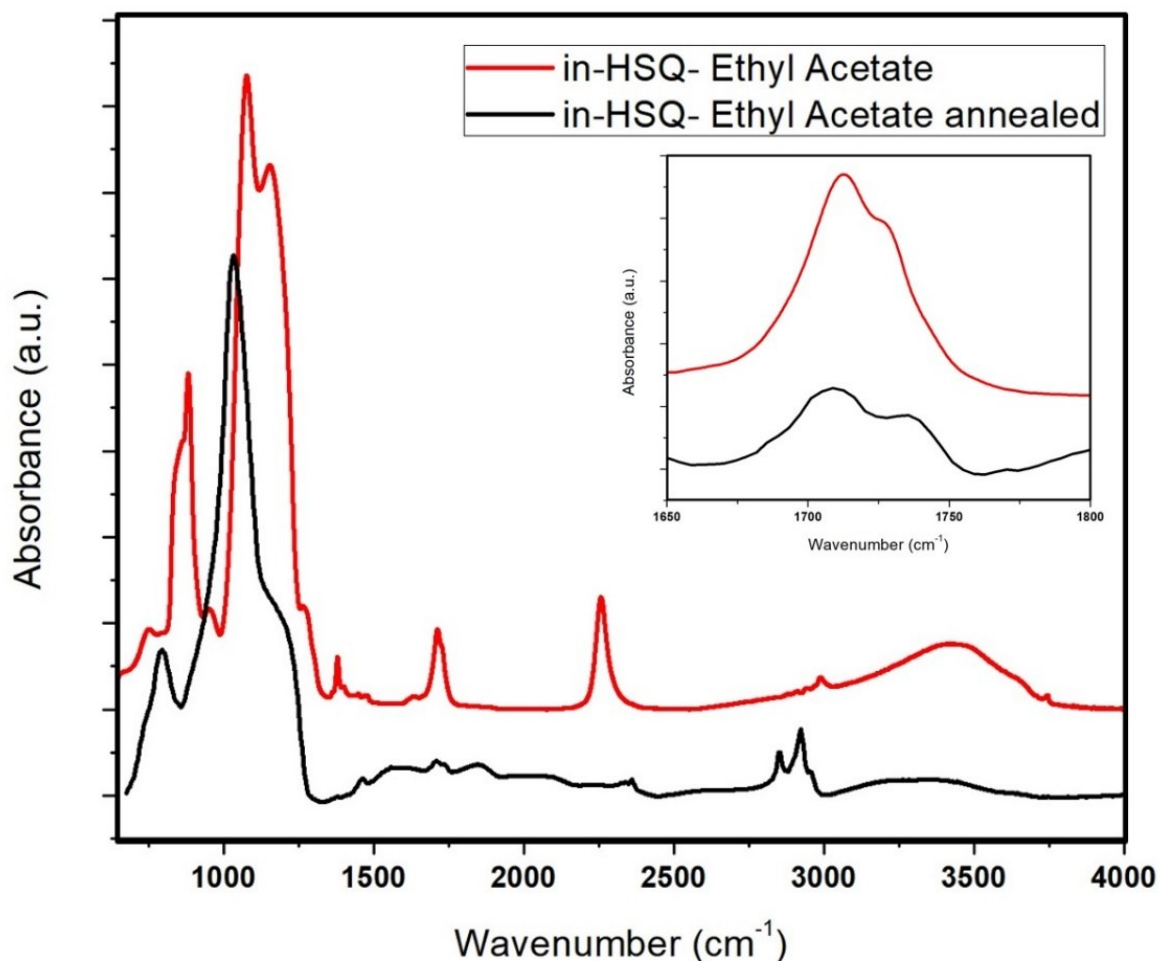


Figure S4: FTIR spectra of in-HSQ-Ethyl-acetate before annealing (red line) and after annealing (black line). Inset detail of ketone related vibrations.

The organic character of in-HSQ- Ethyl-acetate was preserved after the annealing. The FTIR peaks belonging to the HSQ molecule are preserved even after modification. The interesting spectral zone is from 1350-2400 cm⁻¹. The peak 1380 cm⁻¹ could be assigned to a sym. deformation vibration of C-H and the peak around 1450cm⁻¹ to C-H asym. deformation vibration whereas the next bond is an ketone for both peaks.

The peak belonging to carbonyl group has two maxima 1712 cm⁻¹ and 1727 cm⁻¹ in non-annealed in-HSQ-Ethyl-acetate and they slightly shifted to values of 1710 cm⁻¹ and 1735 cm⁻¹ for annealed sample, suggesting two different chemical species next to the carbonyl group (see Fig.S4 inset). The peak Si-O-C(=O)-X in original ethyl-acetate molecule has peak around 1742 cm⁻¹.

The peak around 3400 cm^{-1} which is typical for $-\text{OH}$ groups is probably result of ethyl acetate bonding to or changing the HSQ polymer. The broad peak around 3400 cm^{-1} is similar to the 3400 cm^{-1} peak we observed for in-HSQ-acetone and MIBK, suggesting that the ethyl acetate can bind to the HSQ also via the oxygen next to the carbonyl group. The 3 peaks around 3000 cm^{-1} are typical for $-\text{CH}_x$ bonds and are more visible in annealed in-HSQ-Ethyl-acetate.

S5 PL properties of individual Si-NCs prepared from in-HSQ modified by acetone.

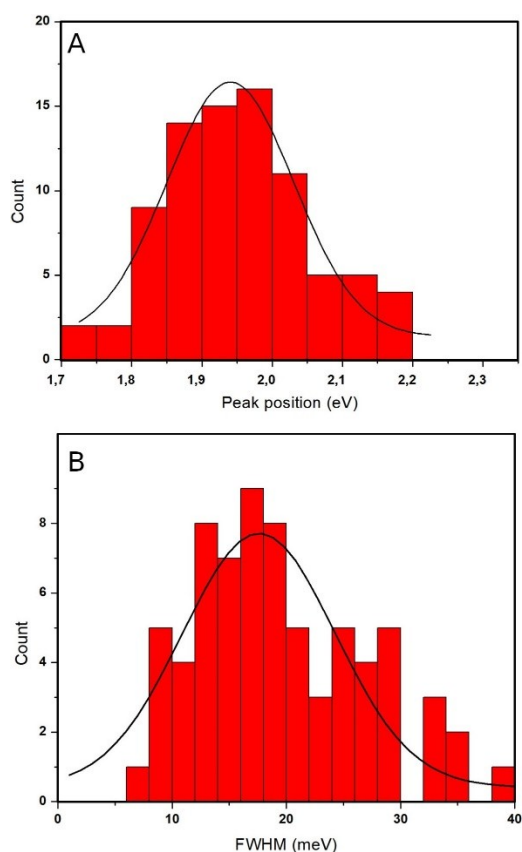


Figure S5: A- PL peak position and B – PL FWHM of single Si-NCs prepared from in-HSQ modified by acetone, measured at room temperature.

S6 PL properties of individual Si-NCs prepared from in-HSQ modified by ethyl acetate.

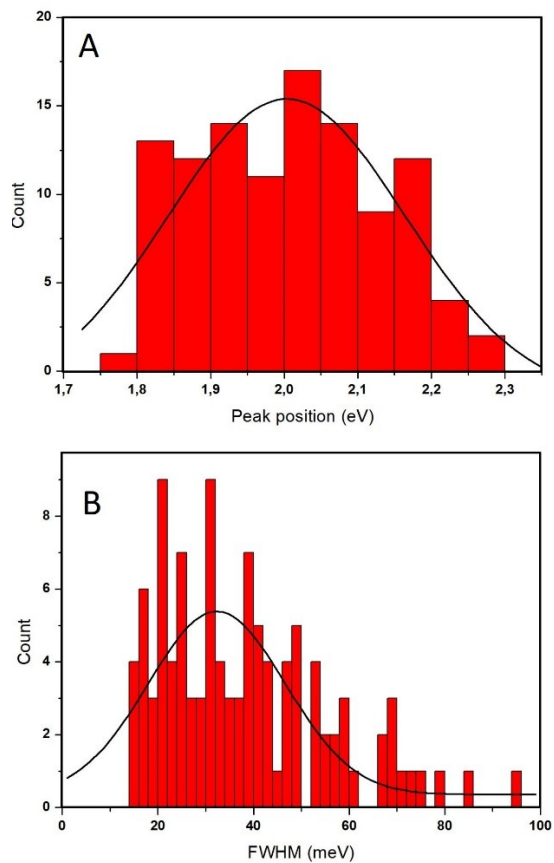


Figure S6: A- PL peak position and B – PL FWHM of single Si-NCs prepared from in-HSQ modified by ethyl acetate, measured at room temperature.