

## Supporting Information

### Application of Surface Selective site-directed crystallization in visual assay of

#### DNA

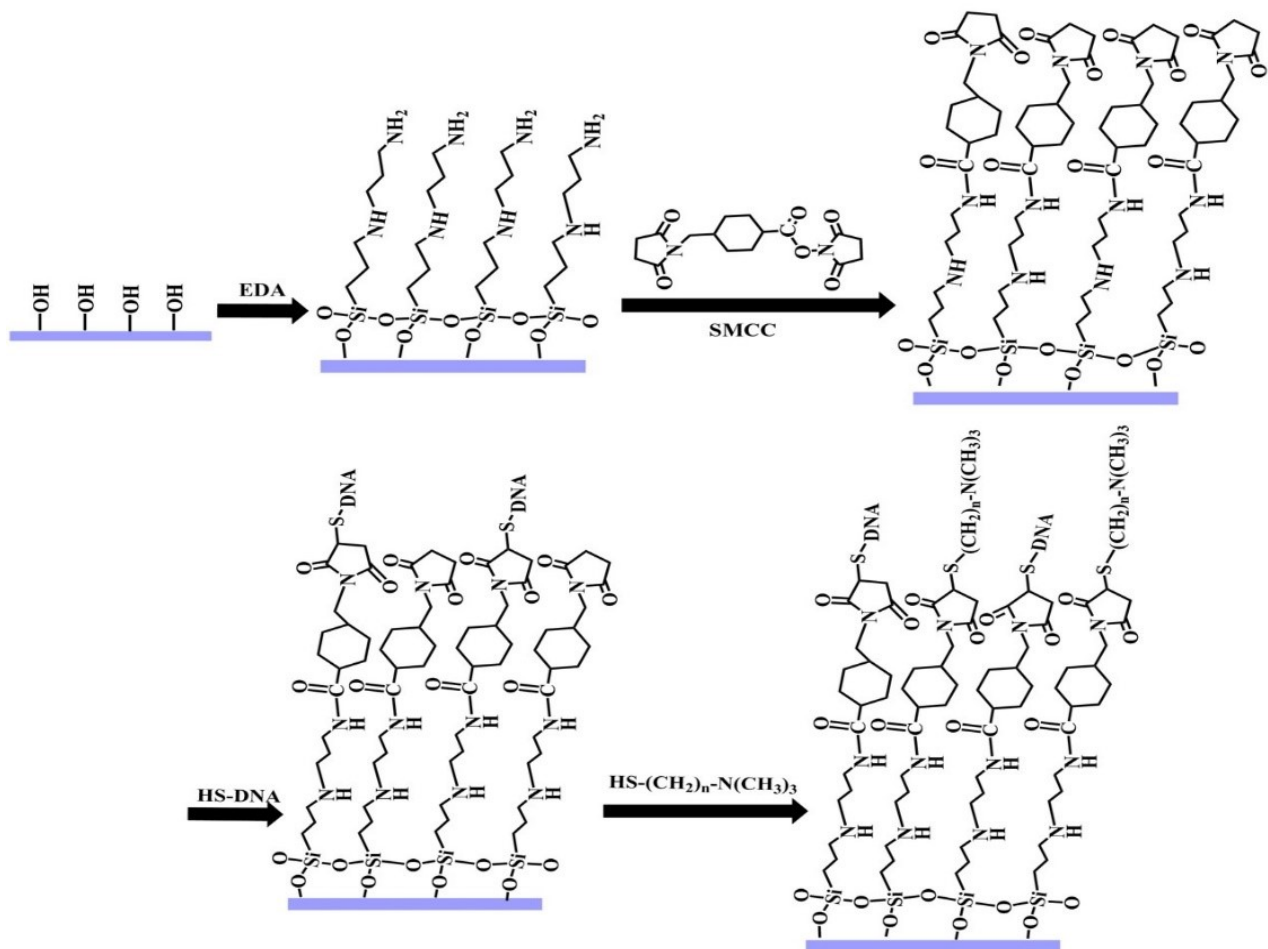
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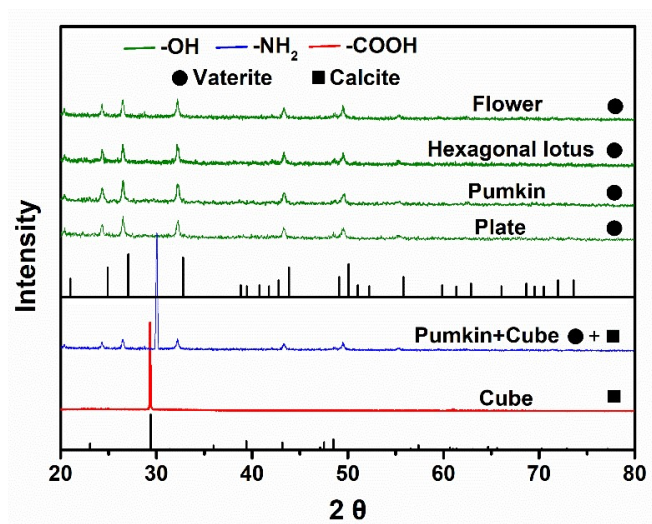
b. Department of Biotechnology, College of Engineering, The University of Suwon, Hwaseong 18323, Korea.

**Table S1.** The DNA oligonucleotides used in SSSC DNA assay method.

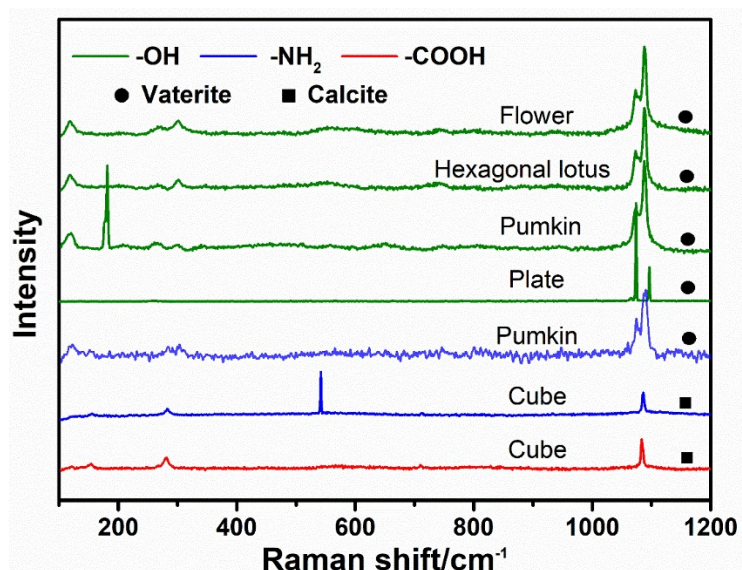
Oligonucleotides used	sequence
Capture DNA (cDNA)	5' ATTTAACAATAATCCAAAAAAAAAAAA-SH 3'
Target DNA (tDNA)	5' GGATTATTGTTAAATATTGATAAGGAT 3'
Probe DNA (pDNA)	5' COOH-AAAAAAAAAAAAATCCTTATCAAT 3'
FAM-probe DNA	5' FAM-AAAAAAAAAAAAATCCTTATCAAT 3'
Random	5' GAGTAATTAGGTTAATAGAGTAGTTGG 3'
HVB	5' TTGGCTTTCAGTTATATGGATGATGTGGTA 3'
HIV	5' AGAAGATATTTGGAATAACATGACCTGGATGCA 3'



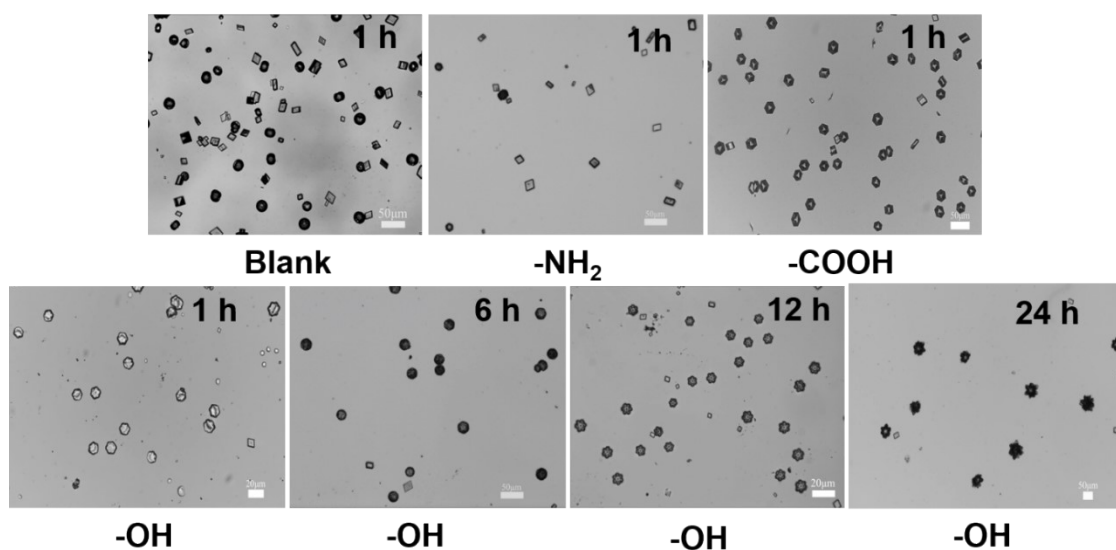
**Figure S1.** Modification process of glass slide.



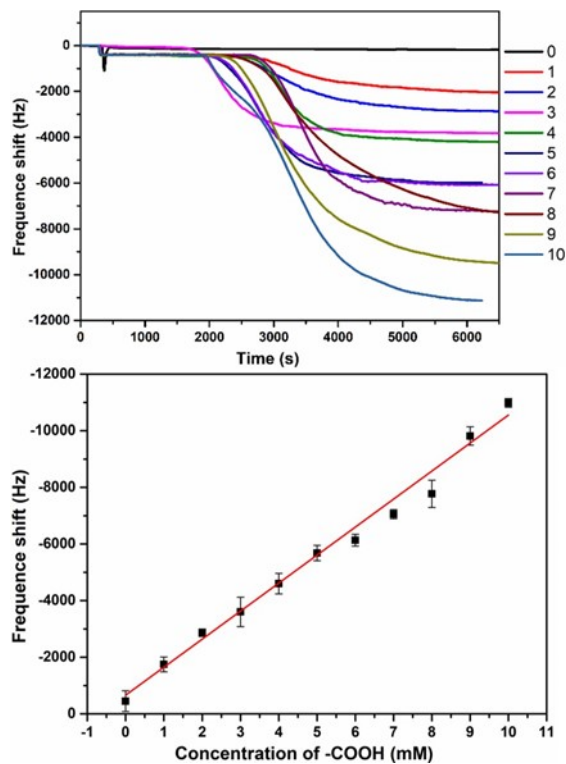
**Figure S2.** X-ray diffraction(XRD) pattern of  $\text{CaCO}_3$  crystals formed on functionalized slides.



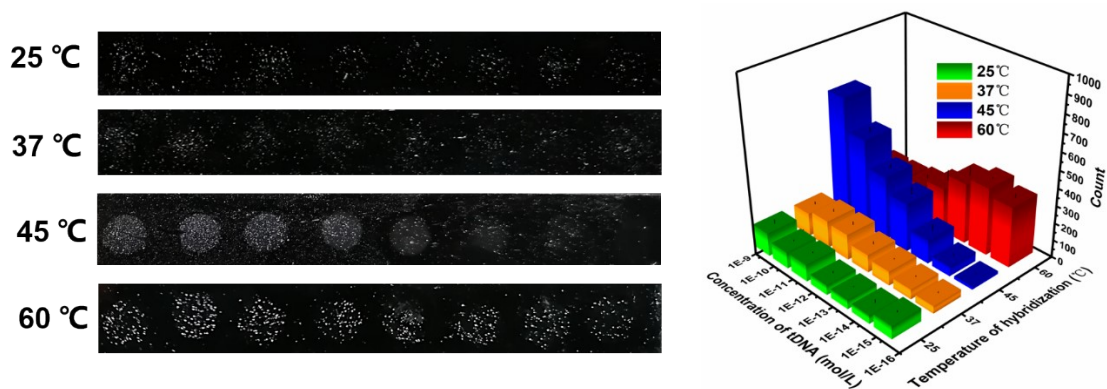
**Figure S3.** Raman spectroscopy of  $\text{CaCO}_3$  crystals formed on functional slides, that 1085, 281 and 153  $\text{cm}^{-1}$  are typical calcite peaks, and the double peaks of 1090 and 1075  $\text{cm}^{-1}$  indicate vaterite crystal.



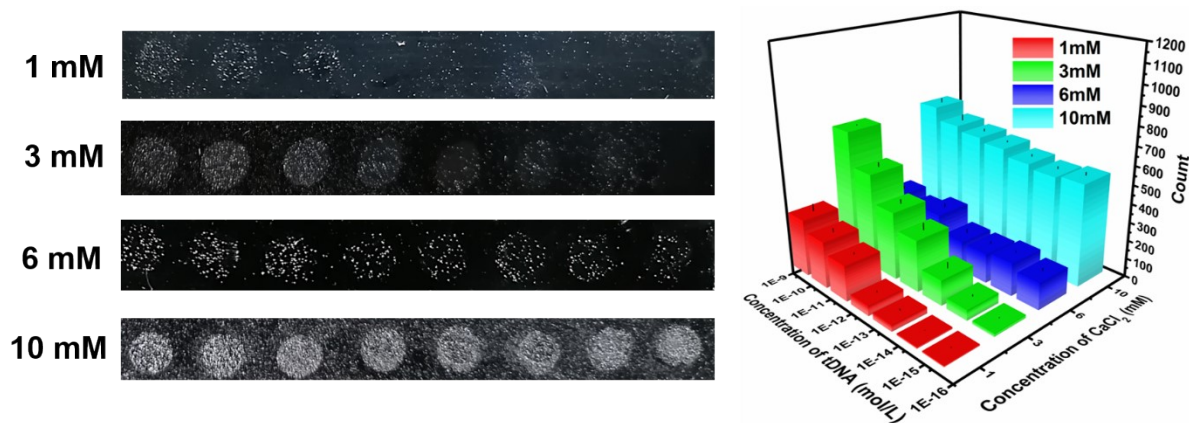
**Figure S4.** Optical microscopy images of functionalized slide surface after  $\text{CaCO}_3$  crystallization experiment.



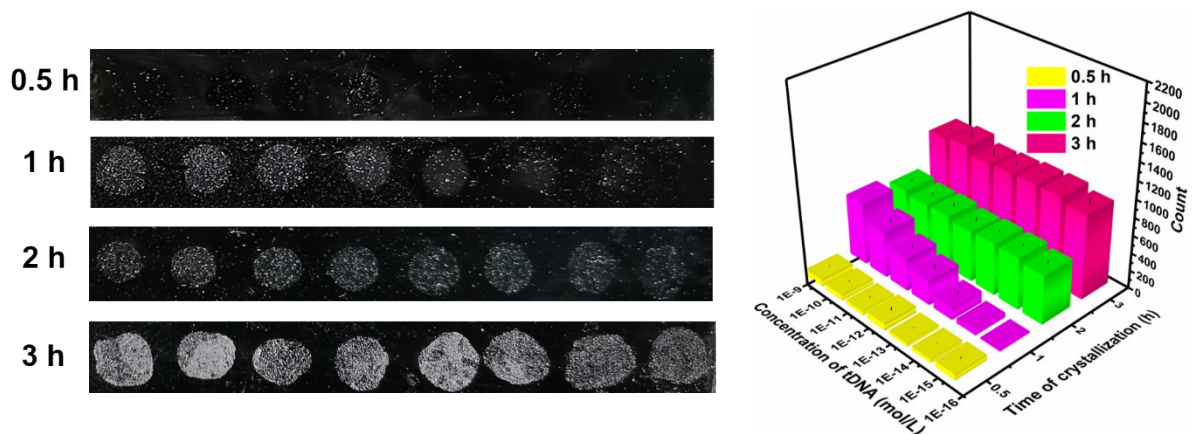
**Figure S5.** Crystal growth was detected by QCM: the concentration of the inhibitory group was fixed to 10nM.



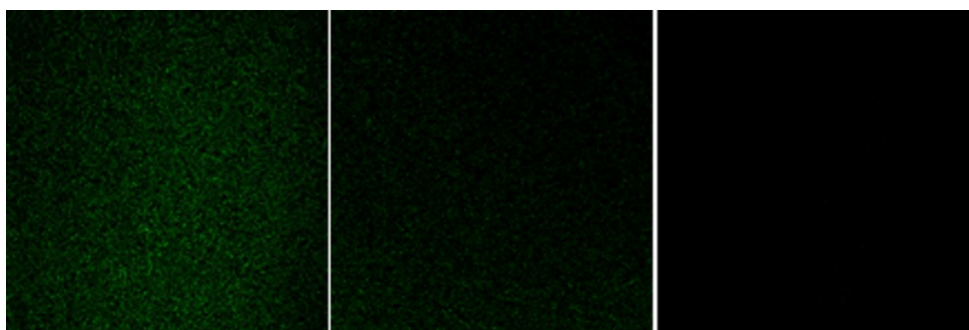
**Figure S6.** Optimization of DNA hybridization temperature used in SSSC DNA assay method, the concentration of tDNA: 1 nM, 100 pM, 10 pM, 1 pM, 100 fM, 10 fM, 1 fM, 0 M. (The concentration of  $\text{Ca}^{2+}$ : 3 mM; crystallization time: 1 h).



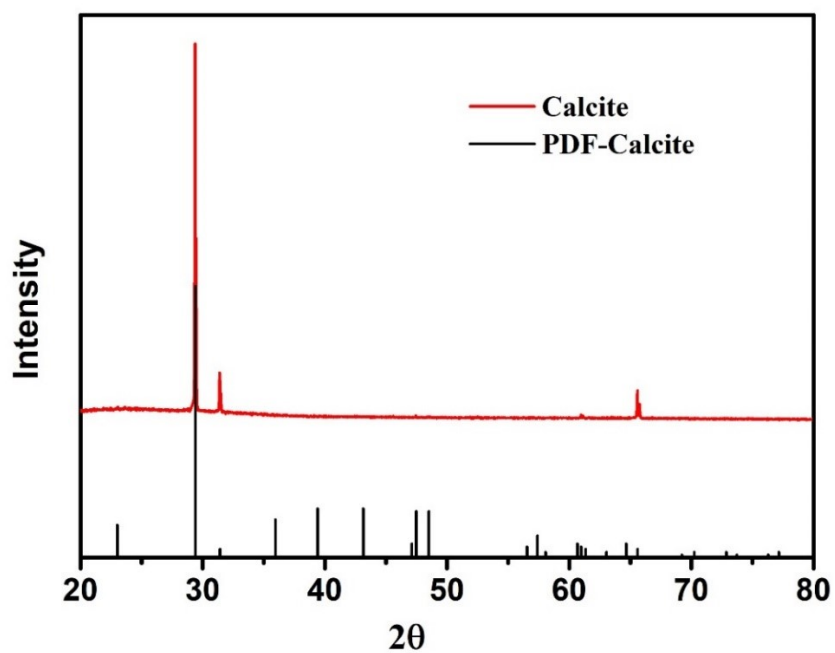
**Figure S7.** Optimization of  $\text{Ca}^{2+}$  concentration used in SSSC DNA assay method, the concentration of tDNA: 1 nM, 100 pM, 10 pM, 1 pM, 100 fM, 10 fM, 1 fM, 0 M. (DNA hybridization temperature: 45 °C; crystallization time: 1 h).



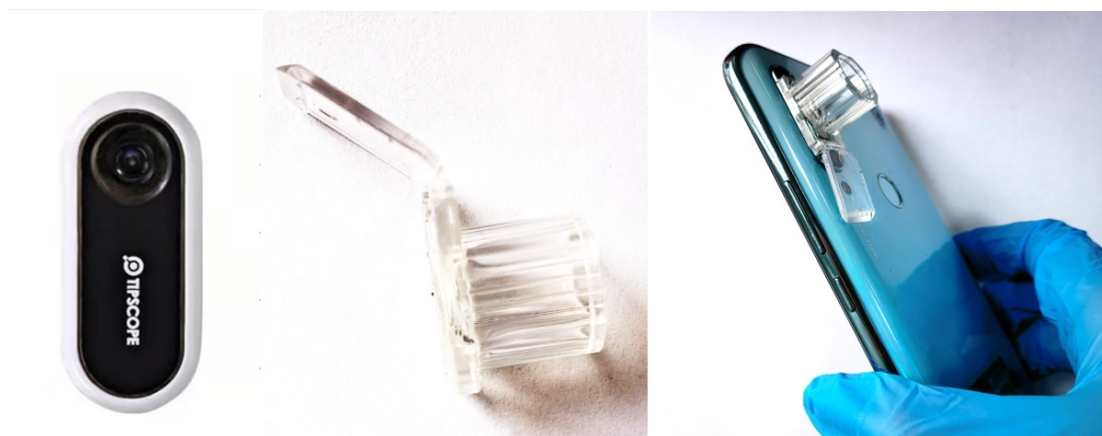
**Figure S8.** Optimization of the crystallization time used in SSSC DNA assay method, the concentration of tDNA: 1 nM, 100 pM, 10 pM, 1 pM, 100 fM, 10 fM, 1 fM, 0 M. ( $\text{Ca}^{2+}$  concentration: 3 mM; DNA hybridization temperature: 45 °C).



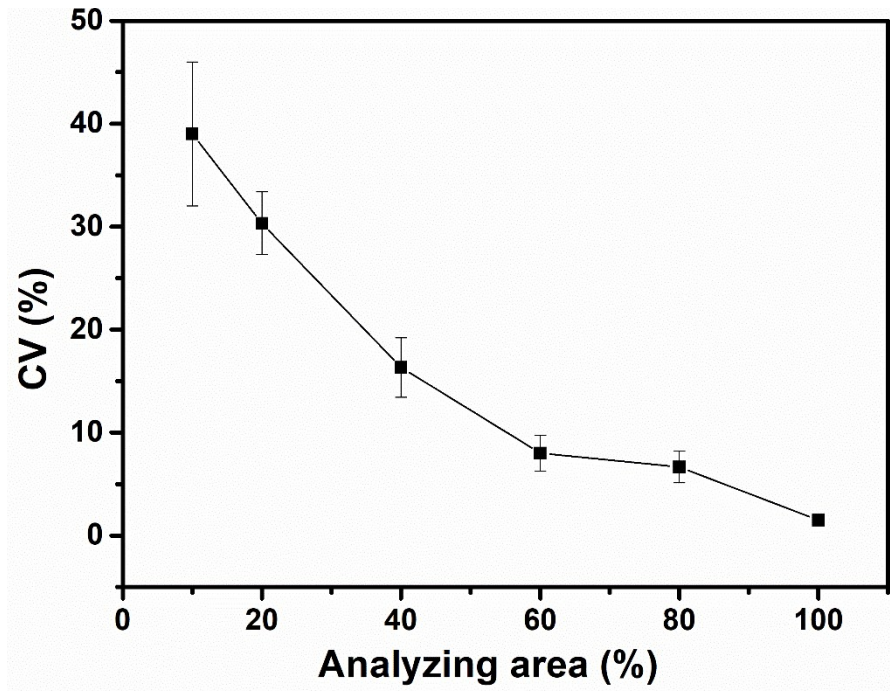
**Figure S9.** Confocal imaging of DNA hybridized with FAM-labeled probe DNA. (tDNA concentration: 1  $\mu\text{M}$ , 100 nM, 10 nM).



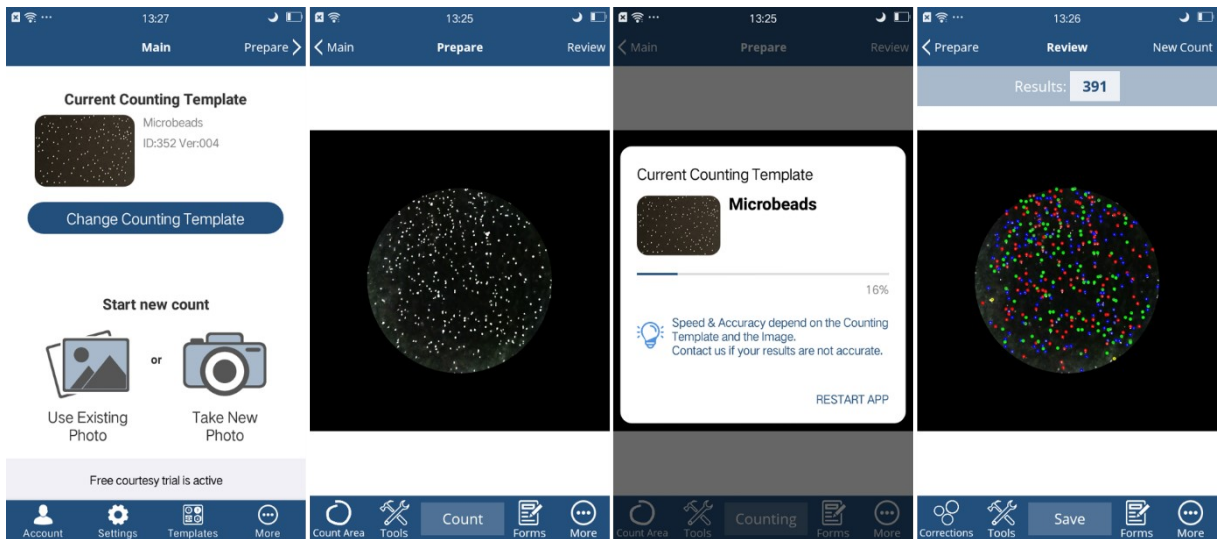
**Figure S10.** X-ray diffraction (XRD) pattern of CaCO<sub>3</sub> crystals formed on glass surface in SSSC DNA assay method.



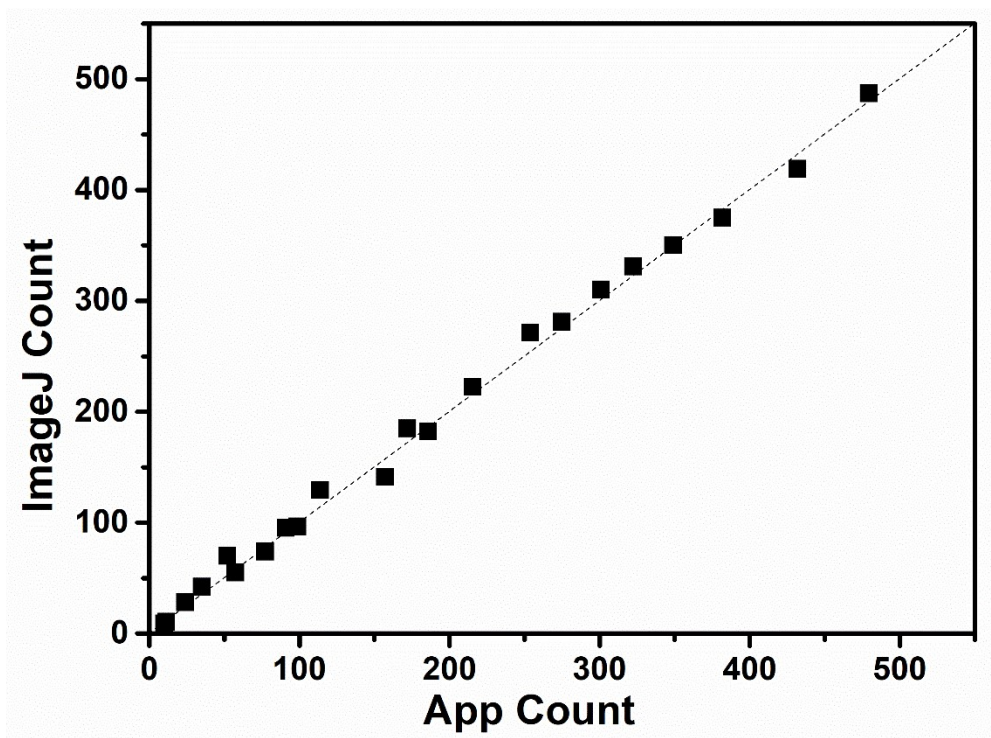
**Figure S11.** Picture of the 20× to 400× and 20× to 200× universal tip scope used in SSSC DNA assay method.



**Figure S12.** CVs of analyzing area. The result shows that the counting accuracy increases with the increment of analyzing area.



**Figure S13.** User interface of the mobile app “Count Things”.



**Figure S14.** The comparison of two counting programs. The readouts by the app “Count Things” correlate well with that by Image J.

**Table. S2.** CVs of crystal counts in SSSC DNA assay method assay of DNA.

<b>tDNA (mol/L)</b>	<b>CV</b>
<b><math>10^{-15}</math></b>	6%
<b><math>10^{-14}</math></b>	14%
<b><math>10^{-13}</math></b>	5%
<b><math>10^{-12}</math></b>	12%
<b><math>10^{-11}</math></b>	7%
<b><math>10^{-10}</math></b>	15%



<b>10<sup>-9</sup></b>	<b>16%</b>
<b>Average CV</b>	<b>11%</b>

**Video S1.** Growth of CaCO<sub>3</sub> crystals on a section of the glass surface recorded by conventional microscope (20× magnification, 1 frame per 30 s, Play at 20× speed).

The video file is provided separately in the attachment