Supplementary Information`

Switchable inhibitory behavior of divalent magnesium ion in DNA hybridization-based gene quantification

[1]Hyowon Jin, [1,2]Hyun Jeong Lim, [3]Mark. R. Liles, [4,]Beelee Chua, and [1,*]Ahjeong Son*

[1]Department of Environmental Science and Engineering, Ewha Womans University, Seoul 03760, Republic of Korea

[2]Department of Chemical and Environmental Engineering, Yale University, New Haven, CT 06511, USA

[3]Department of Biological Sciences, Auburn University, Auburn, AL 36849, USA

[4]School of Electrical Engineering, Korea University, Seoul 02841, Republic of Korea

*Corresponding Author (B. Chua): 145 Anam-ro, Seongbuk-gu, Korea University, Seoul 02841, Republic of Korea; E-mail. bchua@korea.ac.kr; chuabeelee@gmail.com, Phone. +82 (2) 3290-4639

*Corresponding Author (A. Son): 52 Ewhayeodae-gil, Seodaemun-gu, Ewha Womans University, Seoul 03760, Republic of Korea; E-mail. ason@ewha.ac.kr, ahjeong.son@gmail.com; Phone. +82 (2) 3277-3339

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NanoGene assay

The NanoGene assay consists of probe and signaling DNAs each tethered to a quantum dot of a different emission wavelength. The quantum dots' emission wavelengths are 565 and 655 nm and the respective quantum dots are denoted as QD_{565} and QD_{655}, respectively. The probe DNA-QD_{565} complex is further attached to a magnetic bead (MB). Both probe and signaling DNAs have sequences that are designed to capture a specific target DNA. In this way, the target DNA will be hybridized with both probe and signaling DNAs, hence linking them together. A magnetic field is used to hold the MB-QD_{565}-probe DNA complex and MB-QD_{565}-probe DNA-signaling DNA-QD_{655} complex in place while the unlinked signaling DNA-QD_{655} complexes are rinsed away. In this way, the fluorescence ratio of QD_{655} to QD_{565} will be indicative of the quantity of the captured target DNA.