Supporting Information

Creation of Stepwise Concentration Gradient in Picoliter Droplets for Parallel Reactions of Matrix Metalloproteinase II and IX

Sachin Jambovane[1], Duck Jong Kim[1,4], Evert C. Duin[2], Se-Kwon Kim[3] and Jong Wook Hong[1,*]

[1]Materials Research and Education Center, Department of Mechanical Engineering,
Auburn University, Auburn, AL 36840

[2]Department of Chemistry and Biochemistry,
Auburn University, Auburn, AL 36840

[3]Marine Bioprocess Research Center, Pukyong National University,
Busan 608-737, Korea

[4]Korea Institute of Machinery and Materials, Dajeon 305-343, Korea

Supplementary Figure Contents

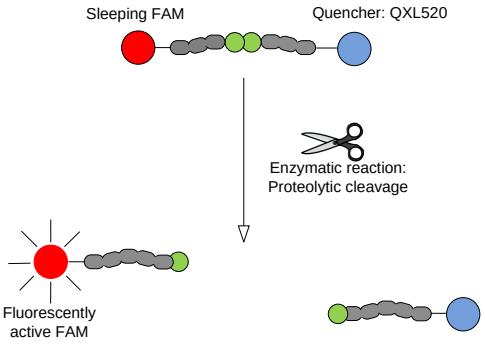

Figure S1. The peptide substrate contains a fluorophore, 5-carboxy-fluoresein-Pro-Leu-OH (FAM), and a quencher, QXL520. Upon proteolytic cleavage of the peptide substrate, the fluorescence of FAM is emitted, and the fluorescence signals are observed as an indicator of enzymatic reaction.

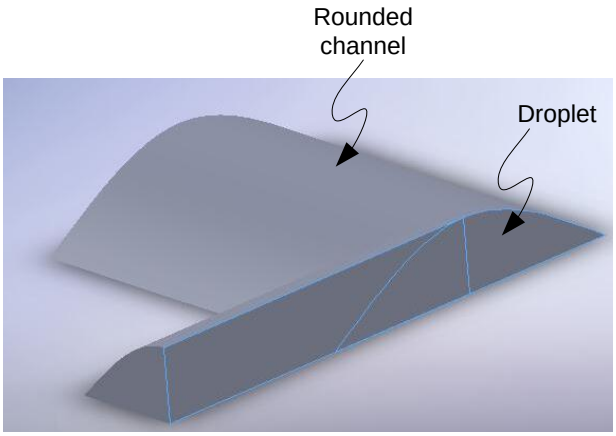

Figure S2. Variation of droplet height in the rounded channel.

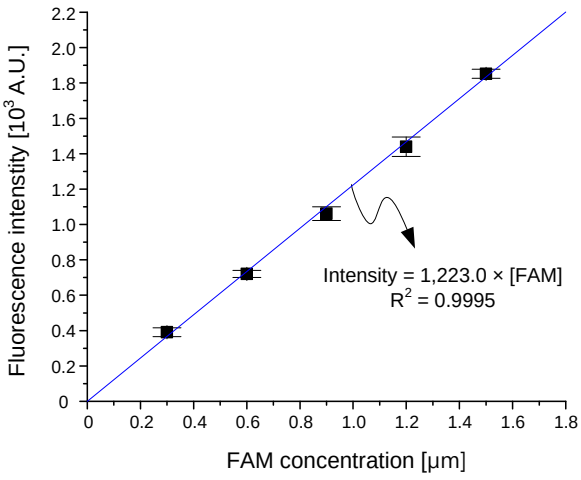

Figure S3. Standard curve of the fluorescent molecule, FAM (off-chip).

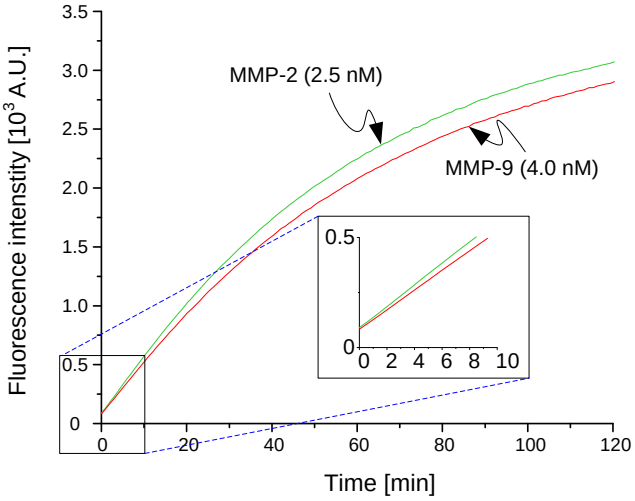

Figure S4. Time traces of enzymatic reaction of MMP-2 (2.5 nM) and MMP-9 (4.0 nM) with substrate concentration of 30 μM. The velocities of these two reactions showed linear responses upto 10 min as shown in the inset figure.

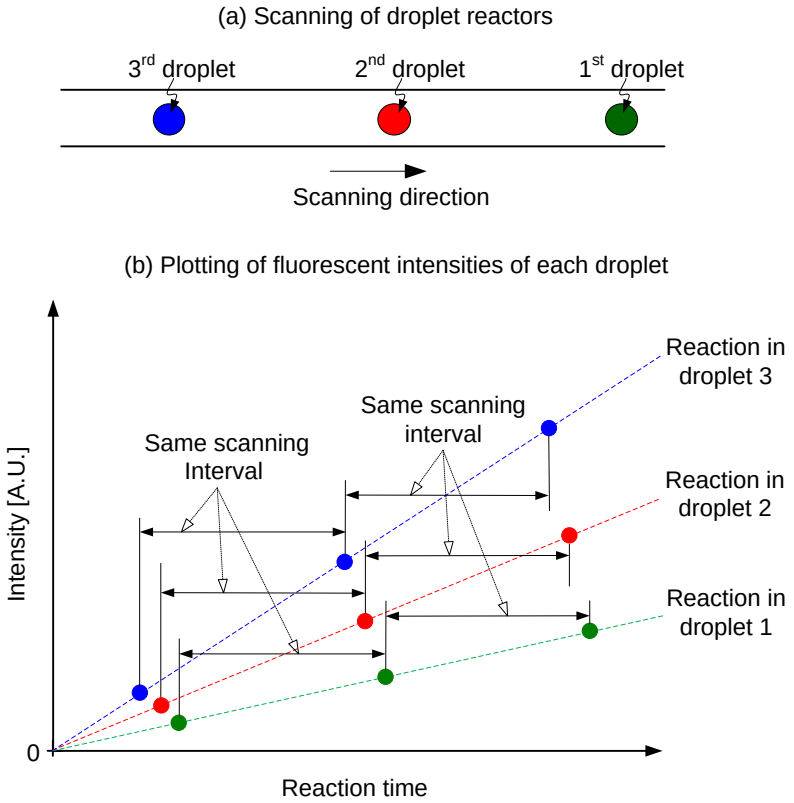

Figure S5. Scanning droplets and plotting of fluorescent signals.

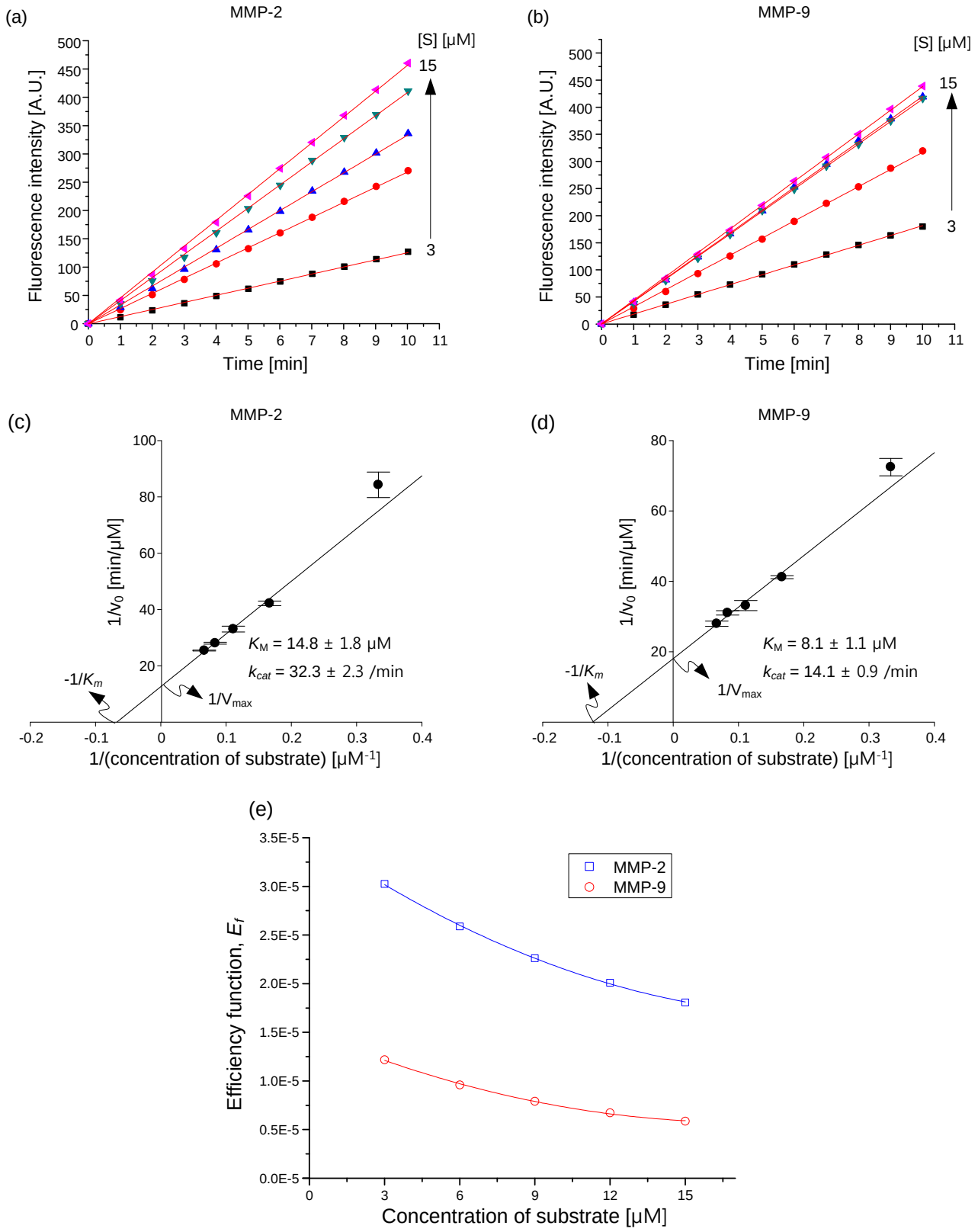

Figure S6. Determination of kinetic parameters using conventional, off-chip, methods. (a) and (b) The time scans of the MMP-2 and 9 reactions with different substrate concentrations. (c) and (d) Linewaever-Burk kinetic plots. (e) Comparison of the efficiency function, E_f , of MMP-2 and MMP-9.

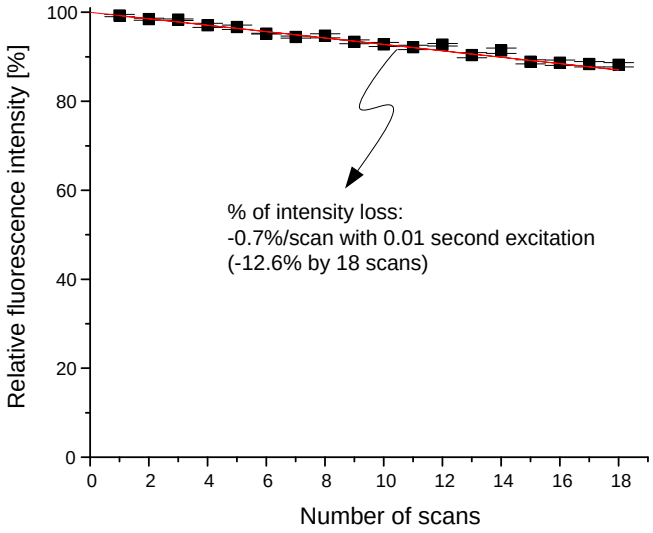

Figure S7. Effect of multiple scans on the photobleaching of FAM. About 0.7% of the fluorescent intensity was decreased with 0.01 s excitation at 490 nm.