Supplementary Information for

Efficient synthesis of vitamin D_3 in a 3D ultraviolet photochemical microreactor fabricated using an ultrafast laser

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List of Figures

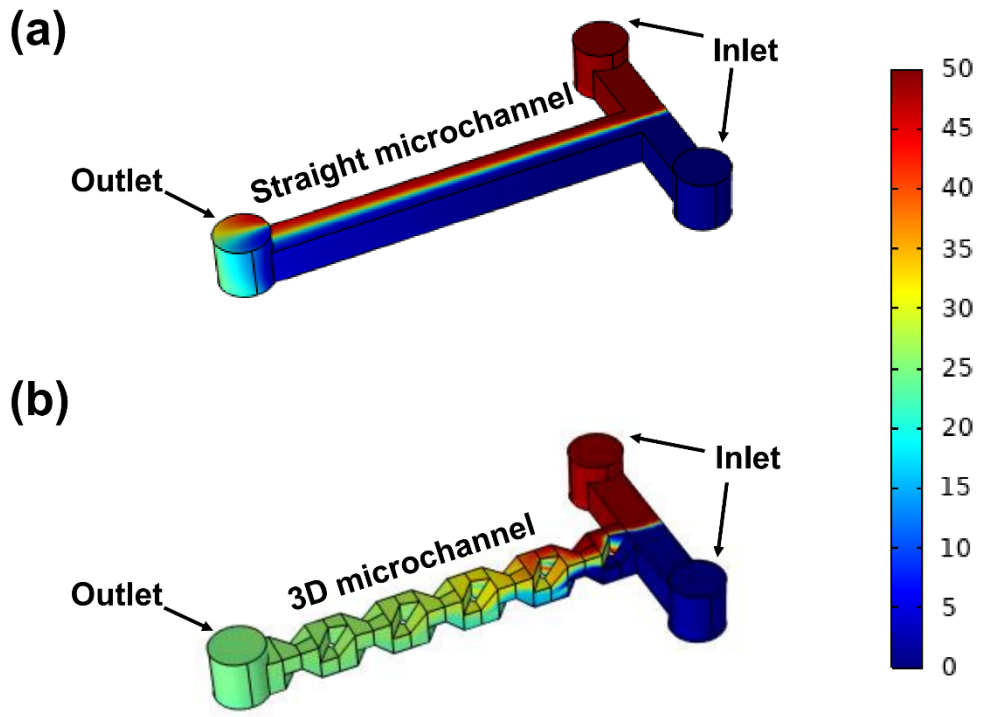

Figure S1. Numerically simulated concentration distributions in T-shaped microchannels (a) without and (b) with 3D micromixing units. The straight and 3D microchannels had the same length and cross-sectional area. The diameters of inlets and outlets were 3 mm, and the flow rate was set as 1 ml min^{-1}. The concentrations of the solutions from the top and bottom inlets of the channels were 50 mol m^{-3} and 0, respectively. The simulated concentration at the outlet of the 3D microchannel structure based on the baker's transformation in (b) was approximately 25 mol m^{-3}, indicating its superior mixing performance.

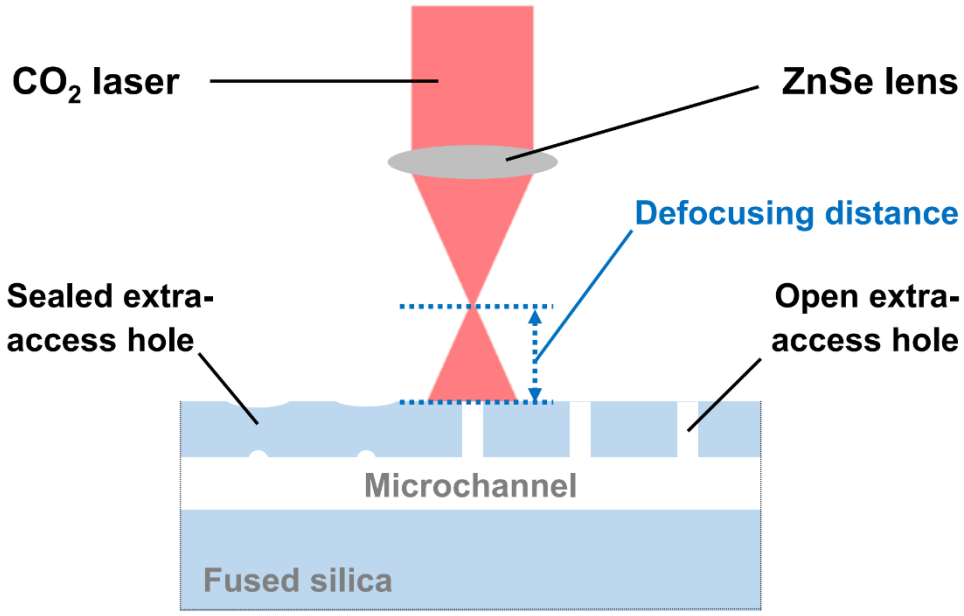

Figure S2. Schematic of defocused CO_2 laser-induced sealing of extra-access holes. The defocusing distance of the CO_2 laser beam was approximately 32 mm.

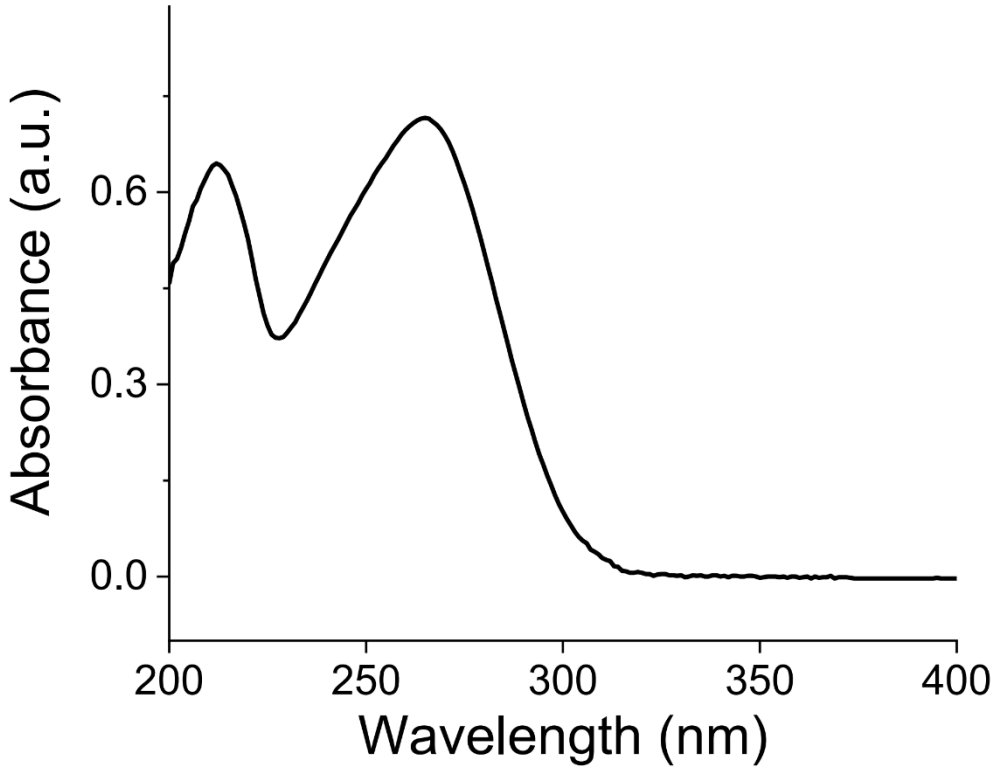

Figure S3. Absorption spectrum of VD3. The corresponding characteristic peaks were located at 213 nm and 264 nm.

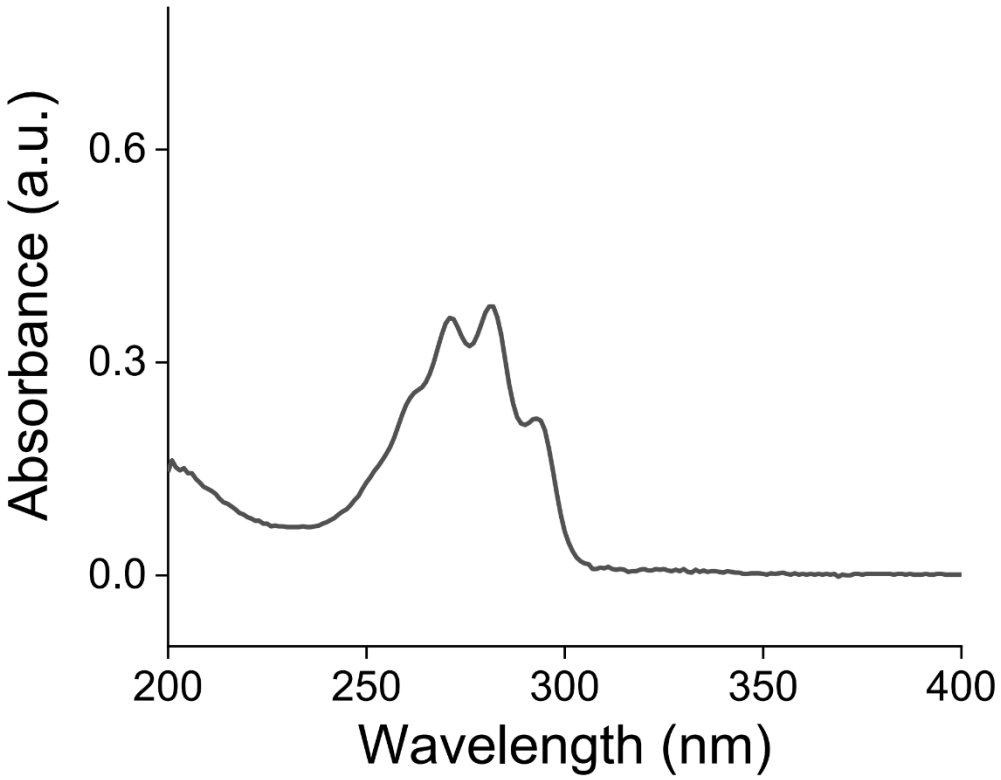

Figure S4. Absorption spectrum of 7-DHC. The corresponding characteristic peaks were located at 272 nm and 282 nm.

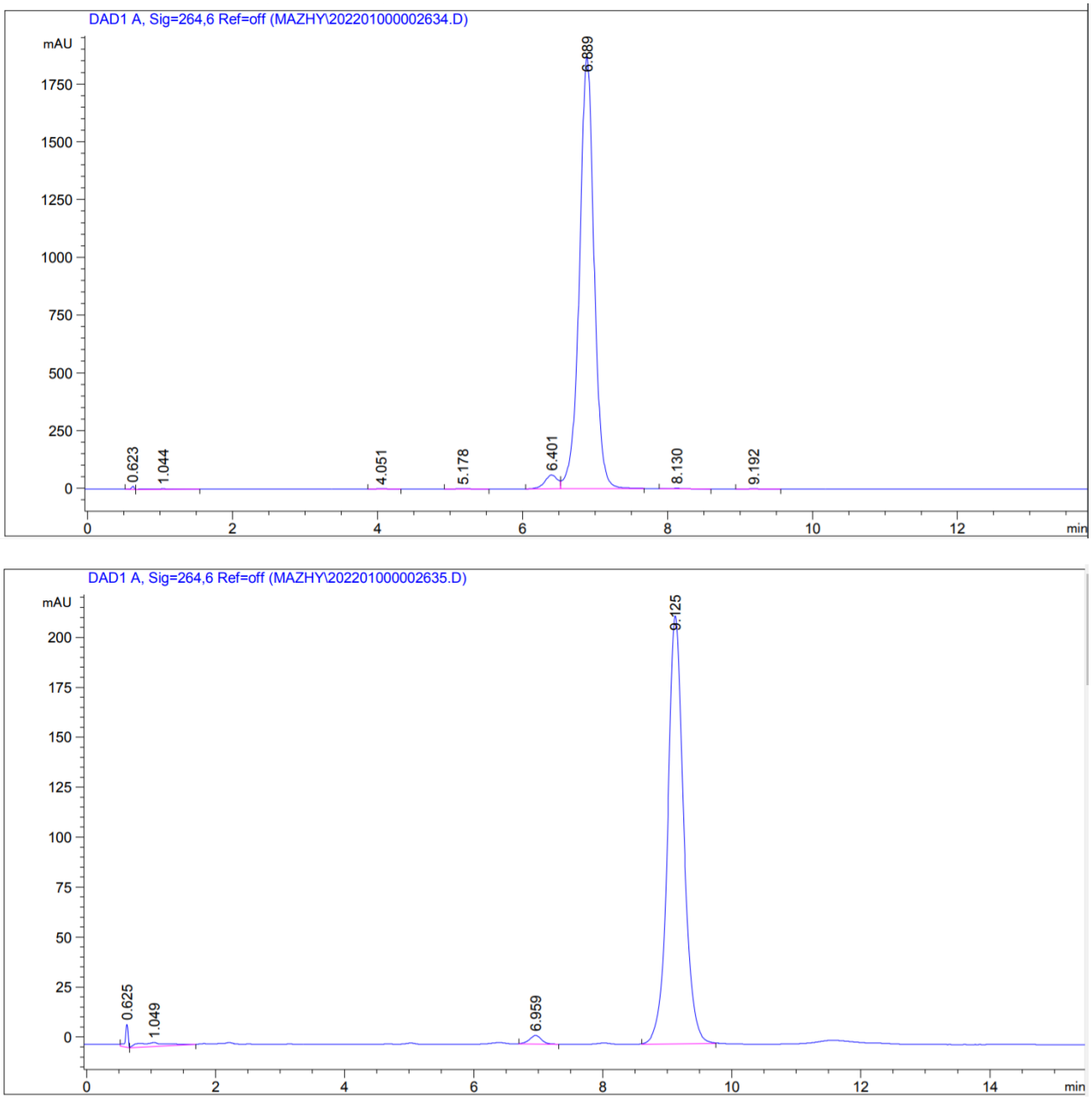

Figure S5. HPLC data of standard VD3 and 7-DHC solution samples. The retention times of VD3 (top) and 7-DHC (bottom) were approximately 6.9 and 9.1 min, respectively.

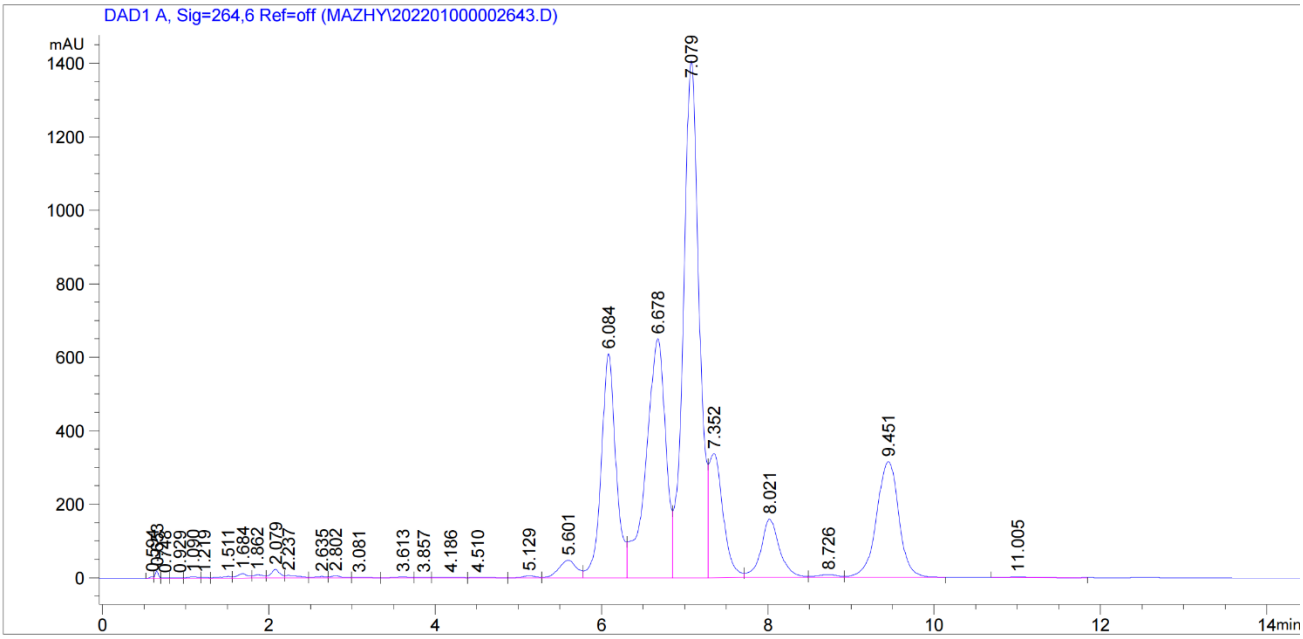

Figure S6. HPLC data of the synthesized products with 275 nm UV irradiation. The retention times of VD3 and 7-DHC were approximately 7.1 and 9.5 min, respectively.

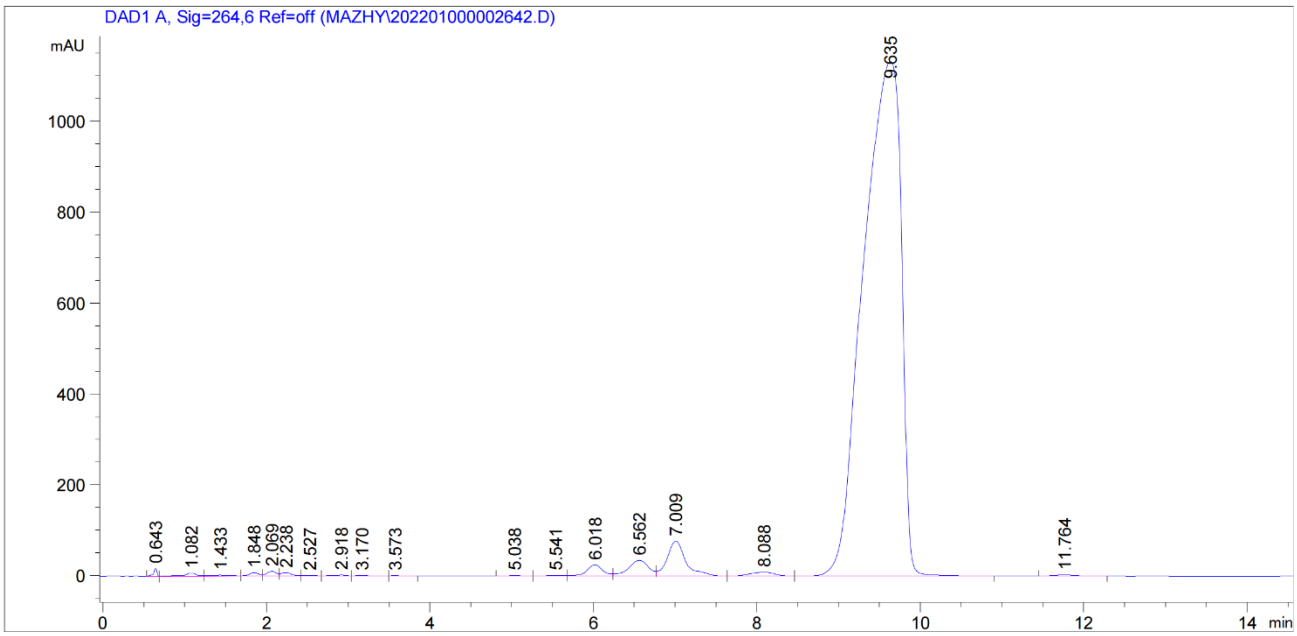

Figure S7. HPLC data of the synthesized products without UV irradiation. The retention time of VD3 and 7-DHC were approximately 7.0 and 9.6 min, respectively.