ELECTRONIC SUPPLEMENTARY INFORMATION (E.S.I.)

Facile Multi-Dimensional Profiling of Chemical Gradients at Millimetre Scale

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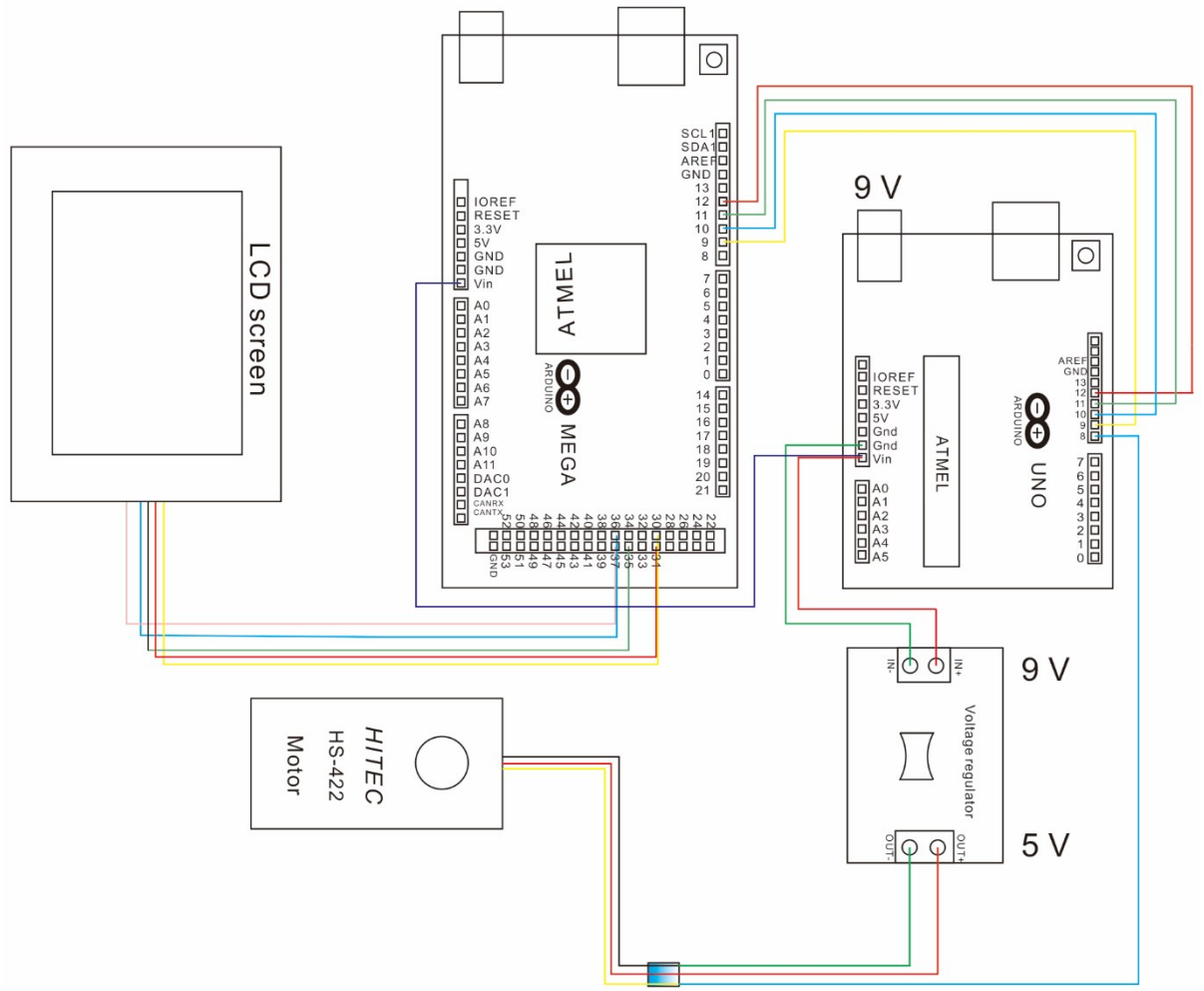

Figure S1. A simplified electronic diagram of the optical tomography system incorporating DC servo, LCD/LED screen, and two Arduino boards, as proposed in the present report.

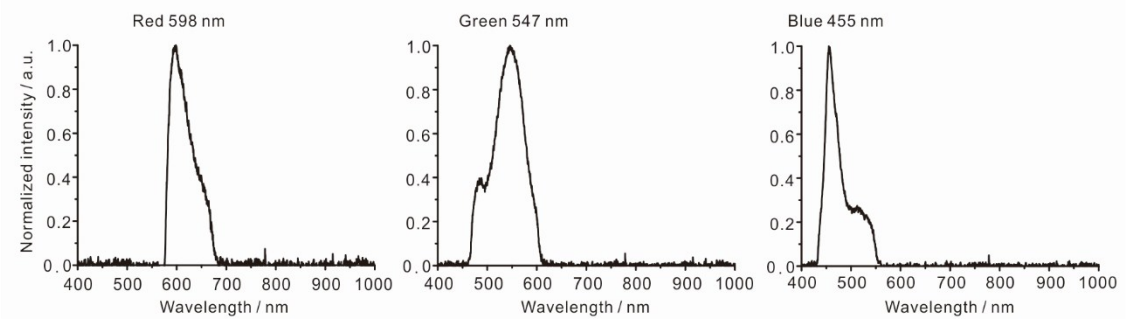

Figure S2. Measurement of the wavelength of light produced by the LCD/LED screen used as the source of light in the present study. The measurement was conducted using a portable spectrometer (USB4000-VIS-NIR; Ocean Optics, Dunedin, FL, USA). Exponential smoothing and scaling has been applied.

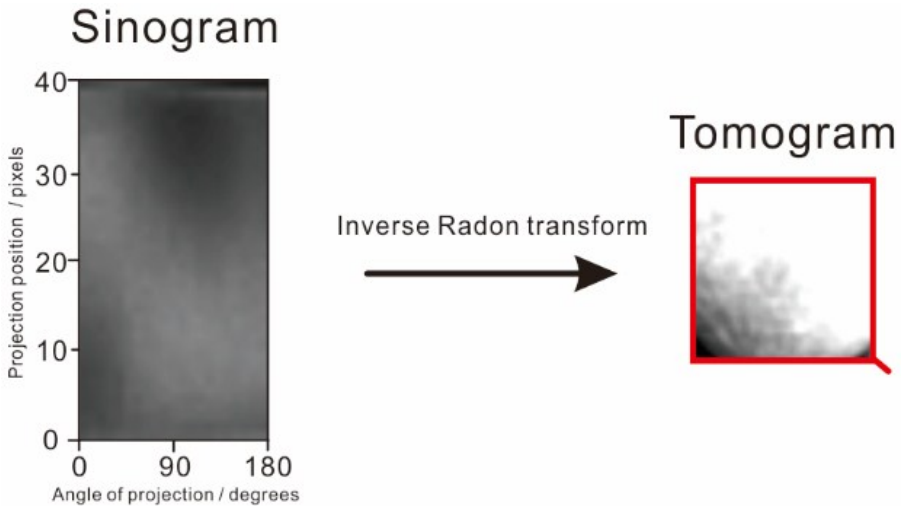

Figure S3. Illustration of data processing. Conversion of sinogram to tomogram by inverse Radon transform. The data are from the experiment depicted in **Fig. 2** (30 min, top).

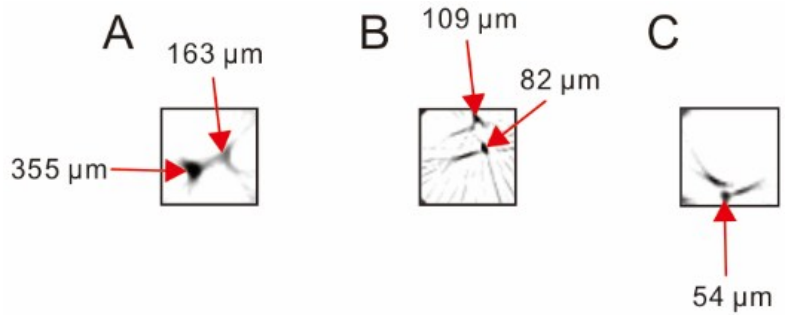

Figure S4. Verification of the spatial resolution of the proposed tomography system. The three tomograms were obtained for the samples containing: (A) two opaque polyimide-coated silica capillaries (OD: 355 µm and 163 µm, respectively); (B) two human hairs (OD: 109 µm and 82 µm, respectively); (C) horse hair (OD: 54 µm). All specimens were suspended within 2% agarose matrix, and positioned perpendicularly to the tomogram plane. The features originating from the imaged objects are distorted due to the high level of light scattering at the surface.

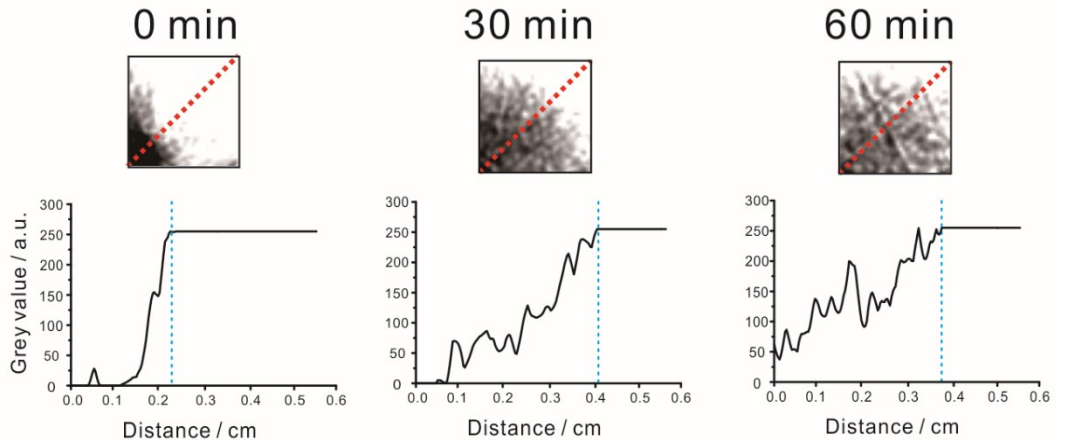

Figure S5. Selected tomograms from the experiment depicted in **Fig. 2**, representing dispersion of methylene blue in 2% agarose matrix over time at an arbitrary height of the vial. The plots in the lower part show the dispersion of methylene blue along a selected intersect (red dotted line in the tomograms). Blue dashed lines indicate the advancing front of methylene blue.

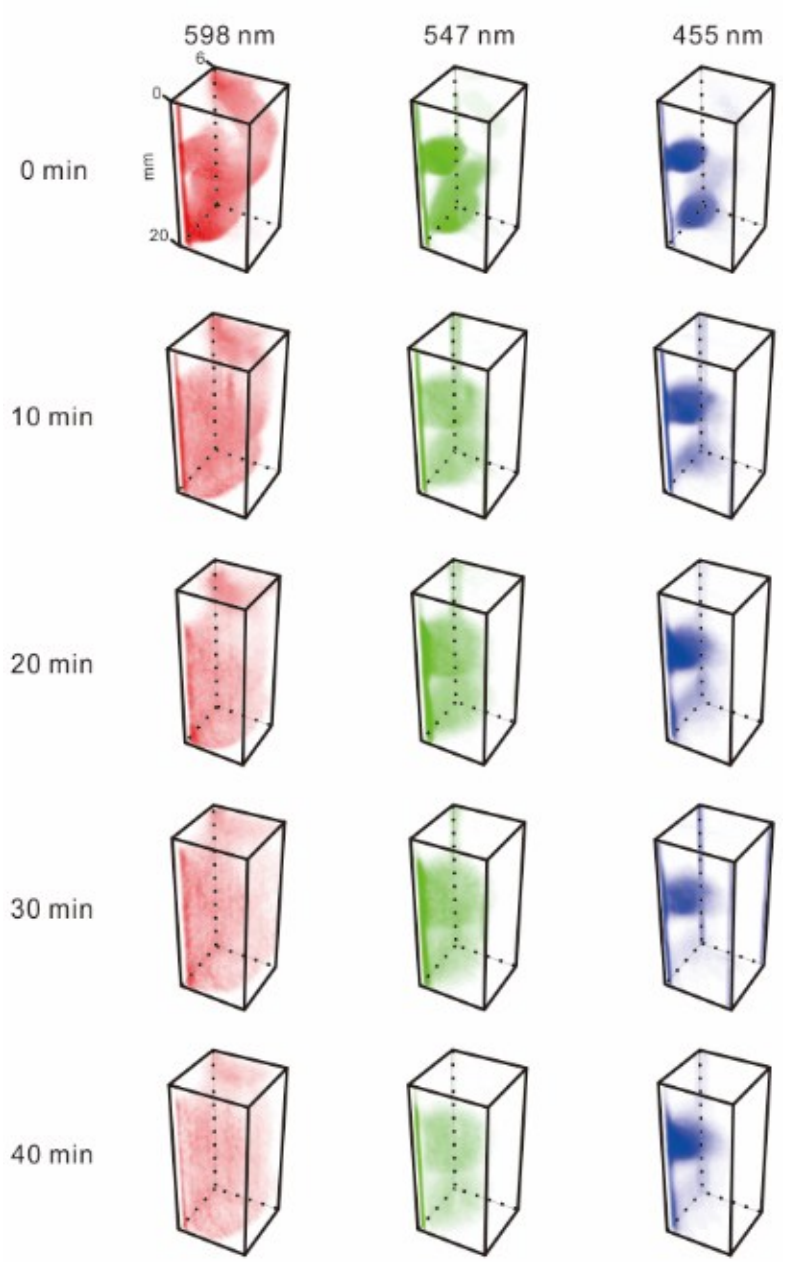

Figure S6. Dispersion of methylene blue in agarose. Methylene blue crystals (~ 0.3 mg) were introduced to the sample cell filled with 2% agarose. Temperature: ~ 24 °C. 3D representations of the sample reconstructed based on the tomograms recorded at different time points and at multiple wavelengths. Dark areas indicate high concentration of methylene blue. Replicate of the experiment presented in **Fig. 2**.

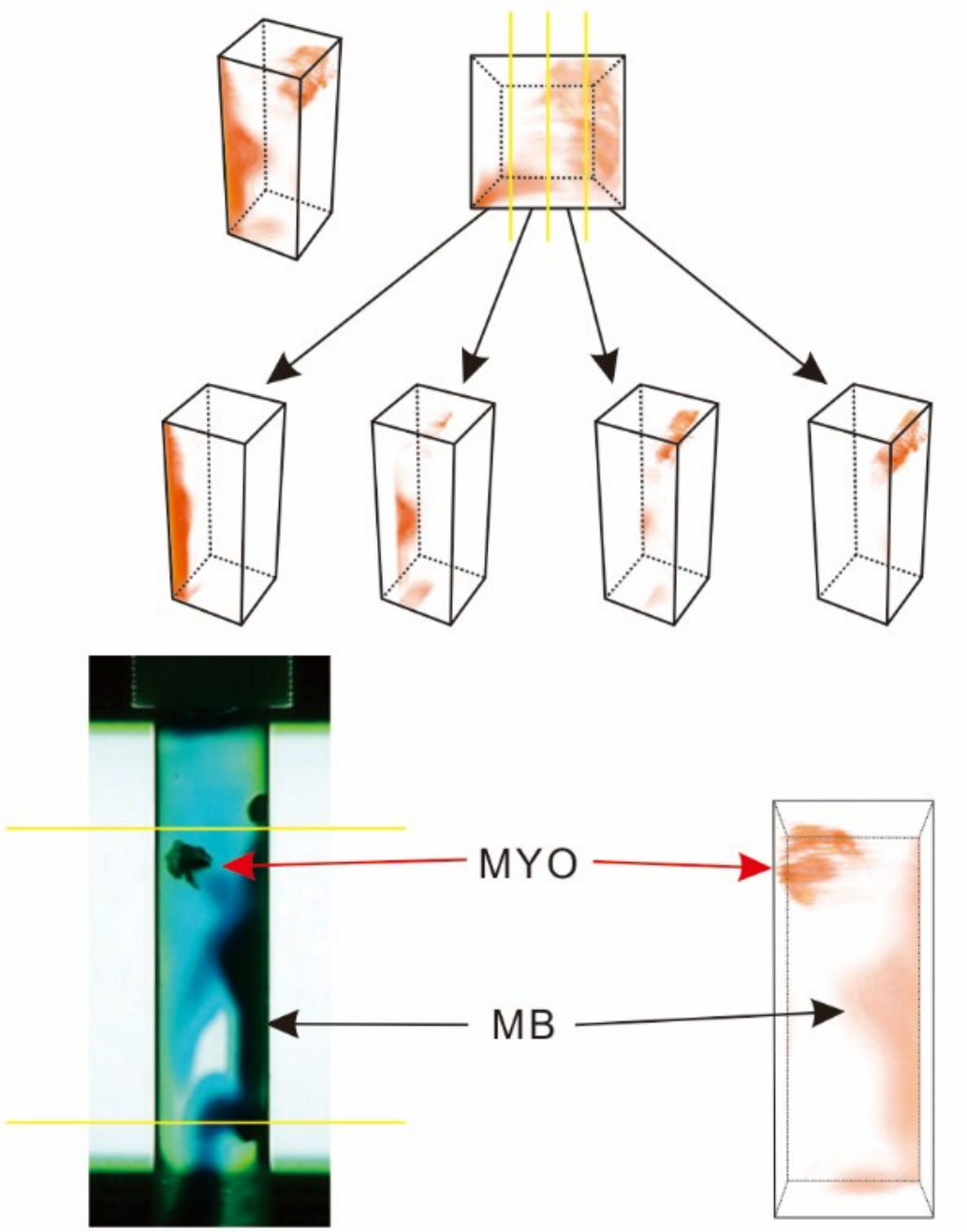

Figure S7. Spectral tomography of a heterogeneous sample containing two substances with distinct optical properties. The sample cell was filled with 2% agarose. Subsequently, ~ 0.6 mg of crystalline myoglobin and ~ 0.4 mg of methylene blue powder were inserted with metal spatula. The sample was scanned at three wavelengths individually, and with the combination of the three wavelengths. This figure presents the result obtained with green light (λ = 547 nm) only. Replicate of the experiment presented in **Fig. 3**. *Top:* The reconstructed 3D representation of the sample was "sliced" along the axial direction in order to reveal the heterogeneously distributed inner components. Dark areas indicate high concentration of the dispersed substances: myoglobin (MYO) and methylene blue (MB). *Bottom:* The zones of myoglobin and methylene blue in the 3D reconstruction can be matched with the spots in the 2D photograph of the sample cell.

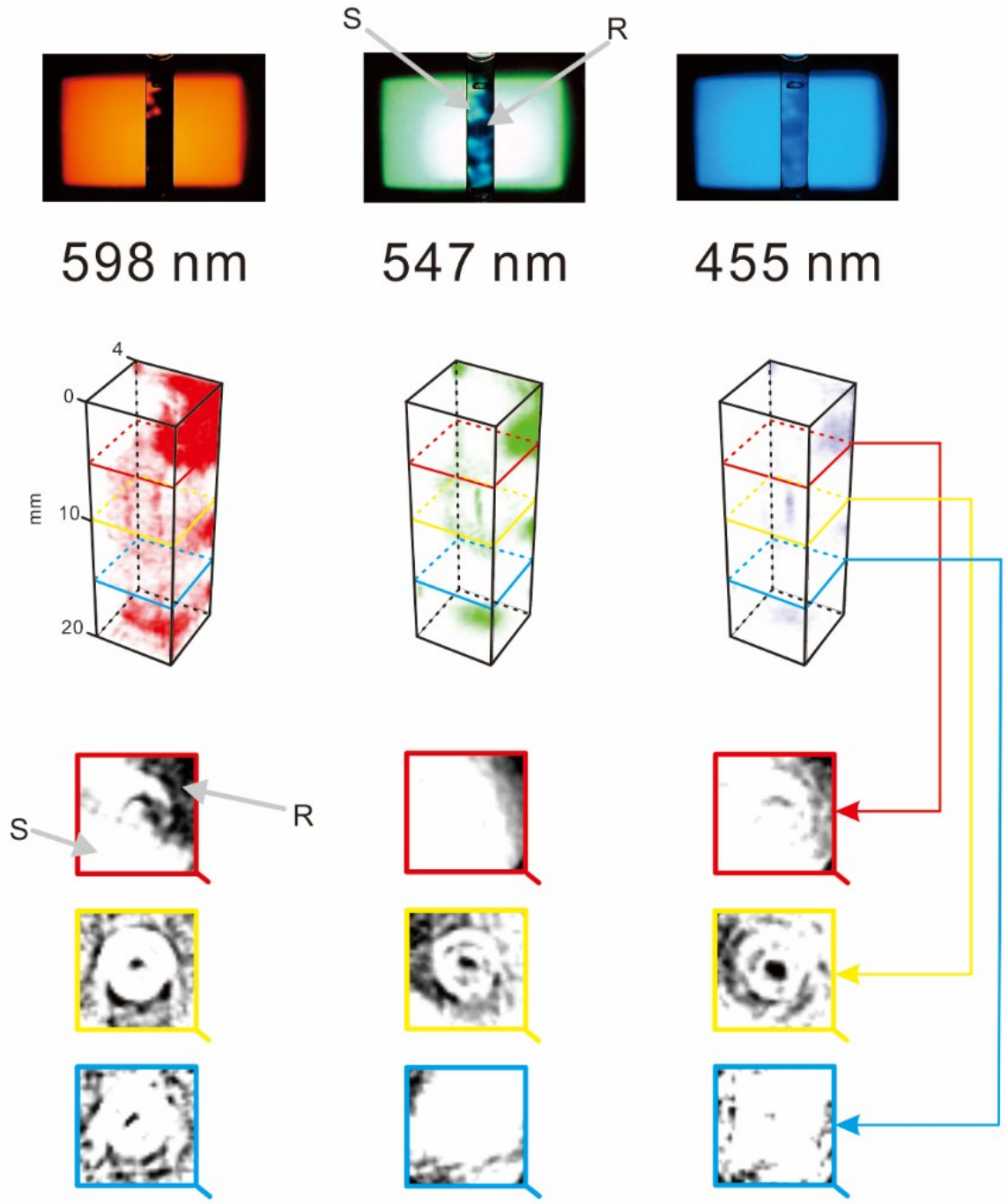

Figure S8. Dispersion of (~ 0.1 mg) ascorbic acid in 0.5% agarose matrix supplemented with 3 mM 2,6-dichlorophenolindophenol. Temperature: ~ 24 °C. *Top:* 3D reconstructed tomograms. *Bottom:* The squares show tomograms of the sample at different heights. R: 2,6-dichlorophenolindophenol reagent; S: ascorbic acid. Dark colour indicates high concentration of 2,6-dichlorophenolindophenol.

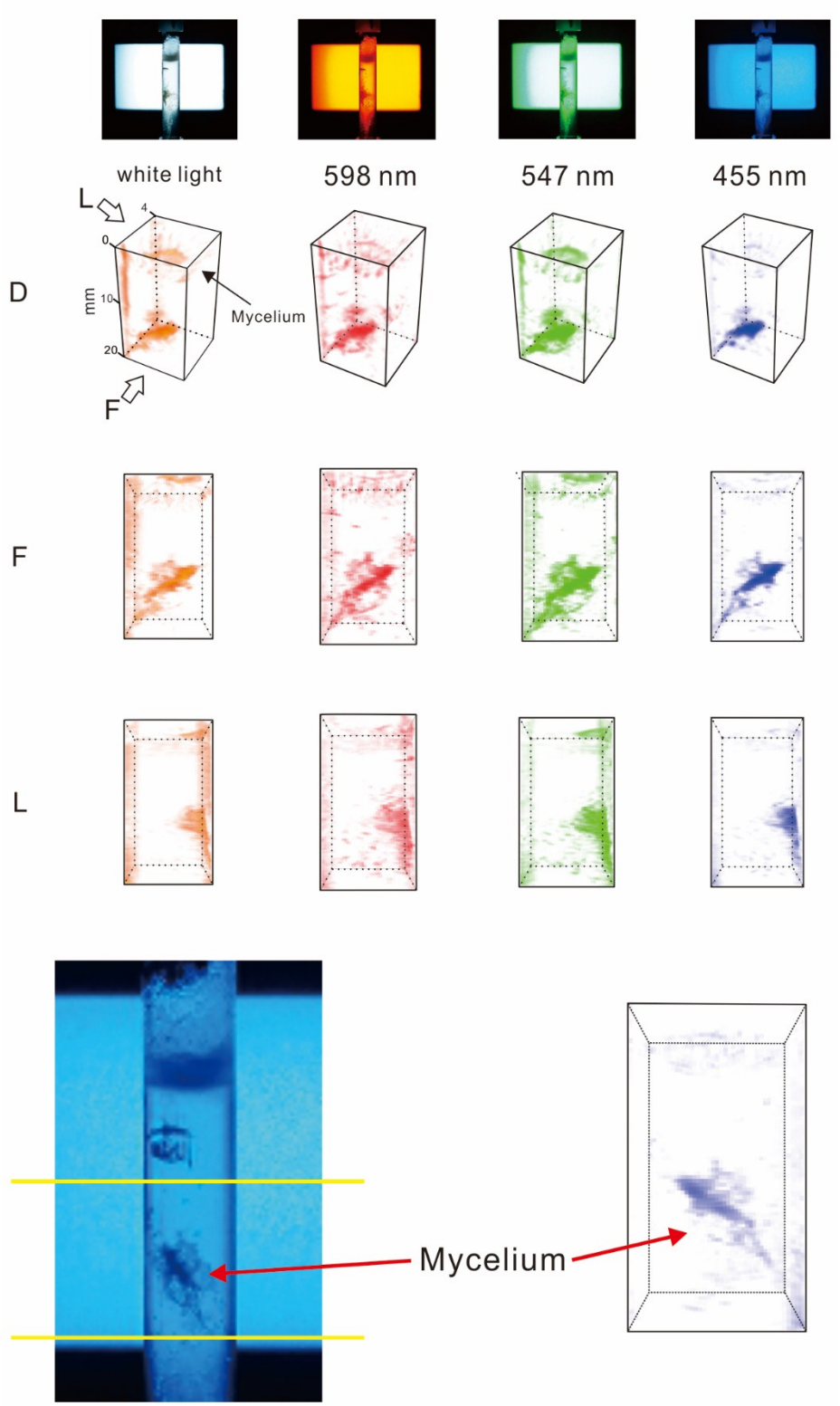

Figure S9. Imaging hyphal growth of filamentous fungi. A small amount of *Neurospora crassa* mycelium was introduced into the lower section of the vial filled with the Vogel's medium containing 0.5% agar. Subsequently, 0.5% agar solution (without Vogel's medium) has been added. The vial was stored at the temperature of ~ 6 °C for 7 days. *Top:* original snapshots (raw data). *Middle:* 3D reconstructions. Labels: D – default view; F – front; L – left. *Bottom:* Comparison of a camera snapshot (λ = 455 nm) and 3D reconstruction oriented in a similar way as the sample cell.