

Description of Additional Supplementary Files

Supplementary Movie 1 | Reconstructed 3D CT model of the RCWSM. The RCWSM sample was scanned using 3D X-ray microtomography to obtain the location and microstructure information of the rigid cavity layers and walls in the regions.

Supplementary Movie 2 | The SENB test process of the SSM. The movie recorded the movement of the SSM sample during the single-edge notched bend (SENB) test to interpret the dynamic behavior of crack propagation in the SSM sample. Images from this movie are displayed in Fig. 3a.

Supplementary Movie 3 | The SENB test process of the RCWSM. The movement of the RCWSM sample during the SENB test was recorded via movie to interpret the dynamic behavior of crack propagation in the RCWSM sample. Images from this movie are displayed in Fig. 3b.

Supplementary Movie 4 | The compressive test process of the SSM. The movie recorded the movement of the SSM sample during the compressive test to interpret the dynamic behavior of macroscopic failure under compressive stress (played at 5X speed). Images from this movie are displayed in Fig. 3g.

Supplementary Movie 5 | The compressive test process of the RCWSM. The movement of the RCWSM sample during the compressive test was recorded via movie to interpret the dynamic behavior of macroscopic failure under compressive stress (at 5X speed). Images from this movie are displayed in Fig. 3h.