**Supplementary Figure Captions**

Figure S1: Video showing a 3D rendering of µCT data for AS3 Zr04 before chemical abrasion.

Figure S2: Video showing a 3D rendering of µCT data for AS3 Zr04 after chemical abrasion at 210 °C for 4 h.

Figure S3: Video showing a 3D rendering of µCT data for SAM-47 Zr30 before chemical abrasion.

Figure S4: Video showing a 3D rendering of µCT data for SAM-47 Zr30 after chemical abrasion at 210 °C for 4 h.