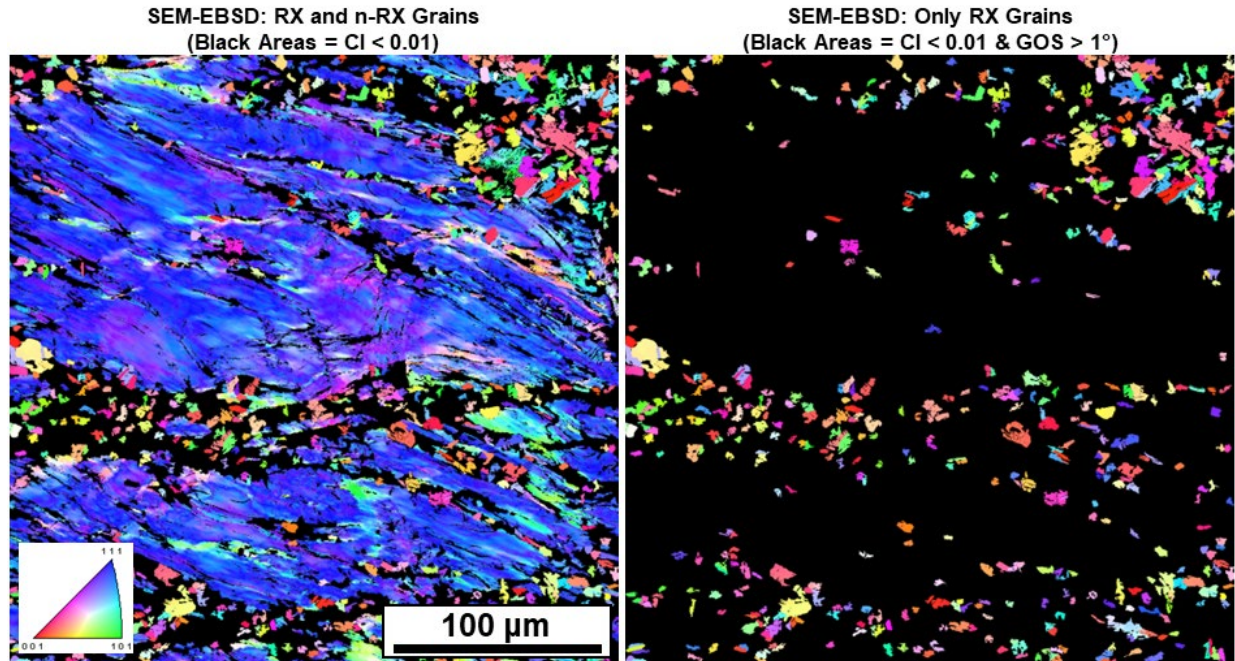


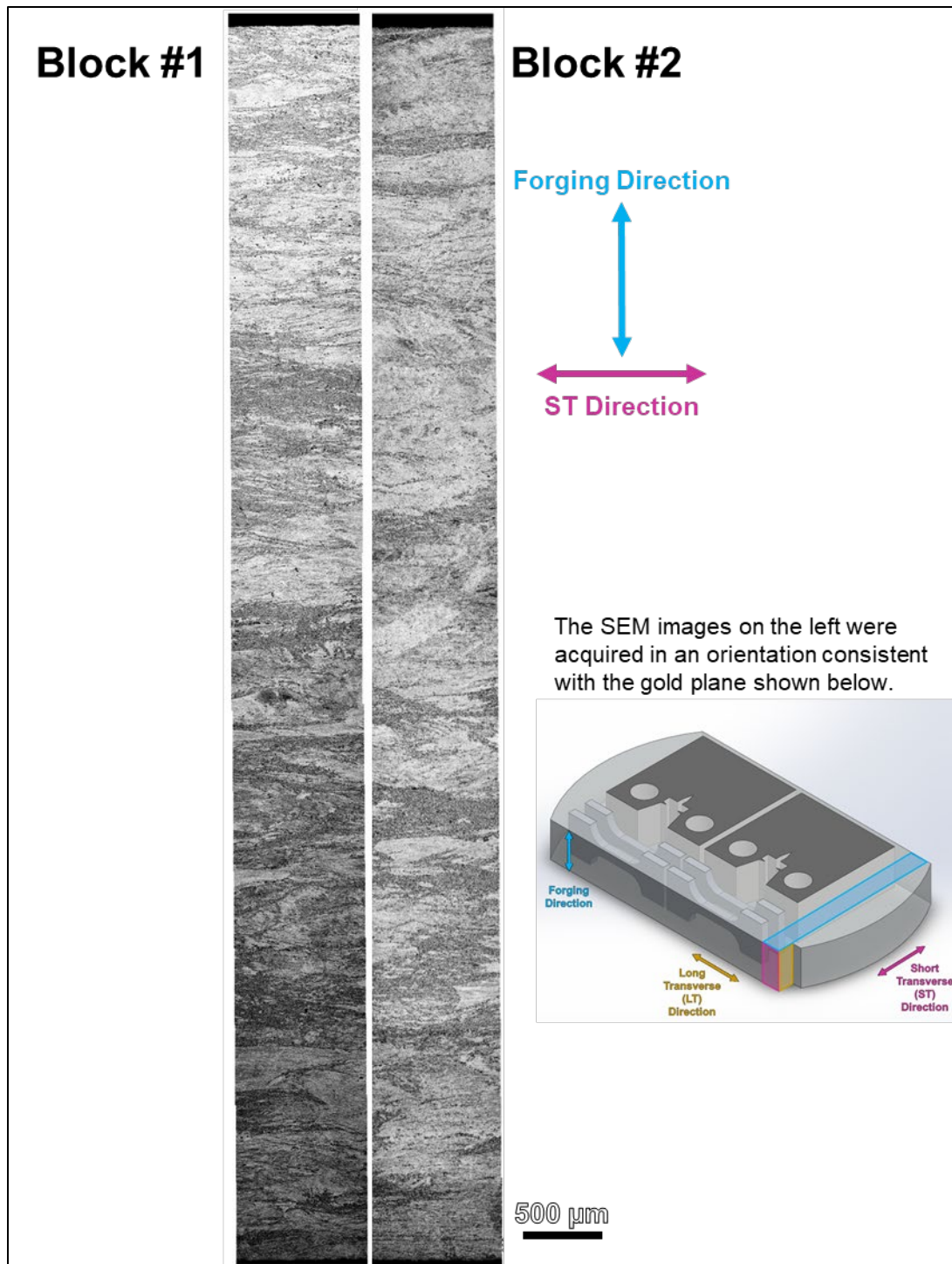
Supplementary Information for
Partially recrystallized microstructures expand the strength-toughness
envelope of CrCoNi medium-entropy alloy

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Bryan Crossman, Easo P. George, Michael J. Mills, Robert O. Ritchie

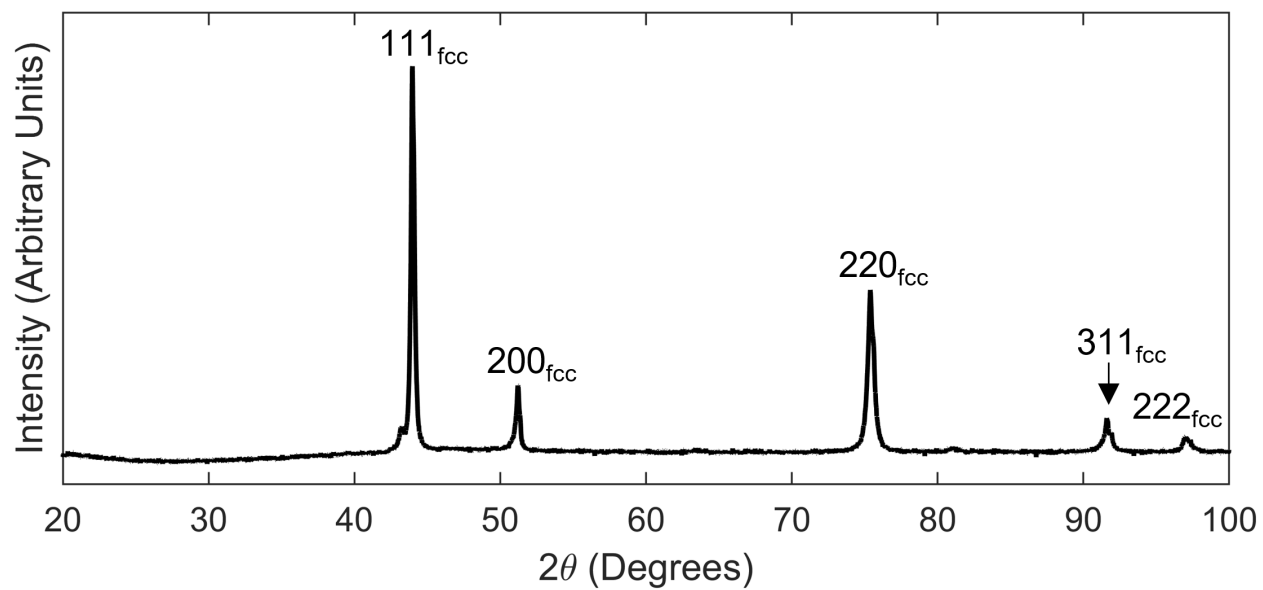


Supplementary Figure 1: SEM-EBSD results from the forging plane showing the same area with all indexed grains (left) and with only recrystallized grains (right). Black areas indicate points that were excluded from the maps. In the left image, points with confidence index (CI) < 0.01 were excluded. In the right image, points with CI < 0.01 and points belonging to n-RX grains with grain orientation spread (GOS) > 1° were excluded.

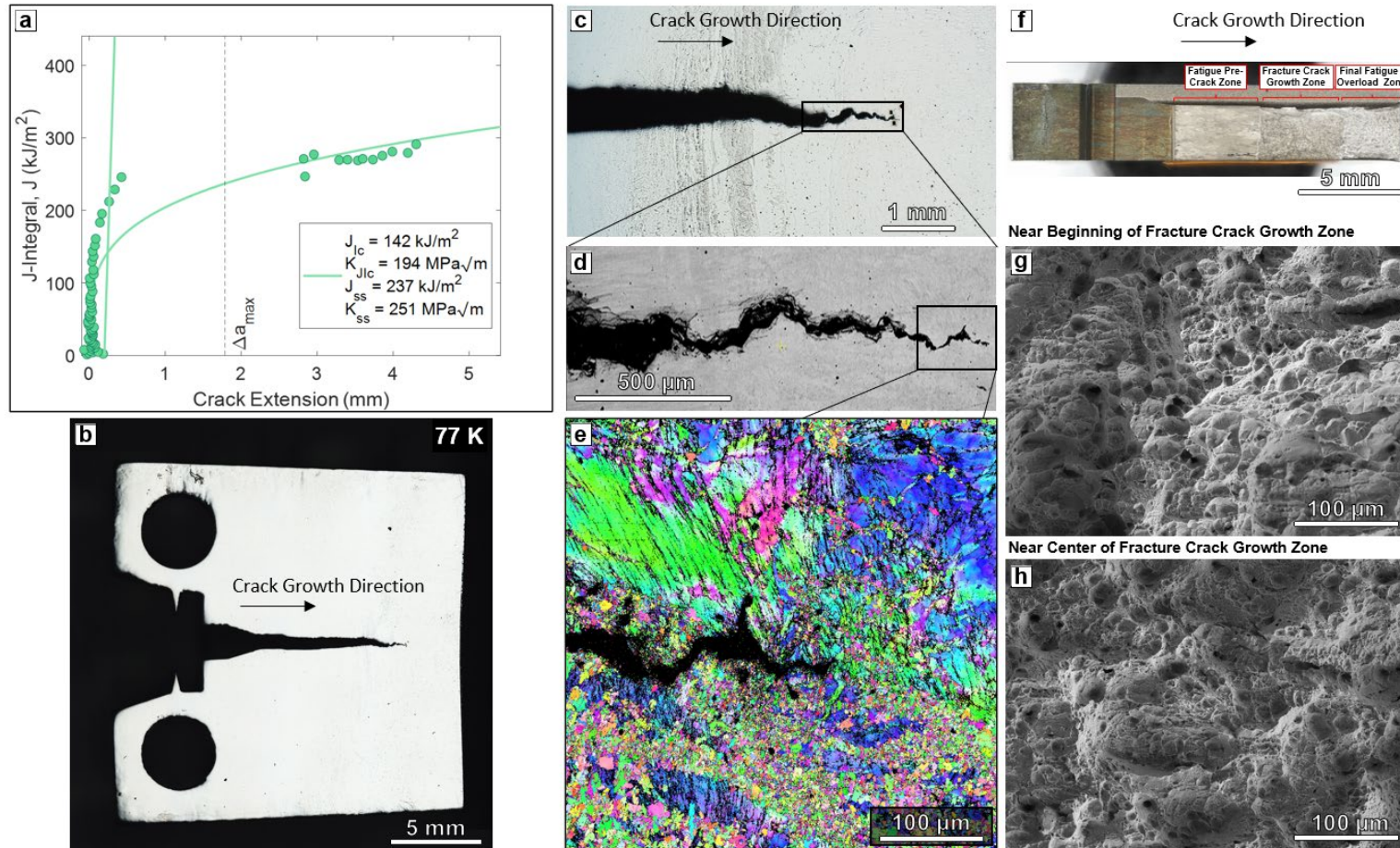
* Corresponding author: cslone@exponent.com.



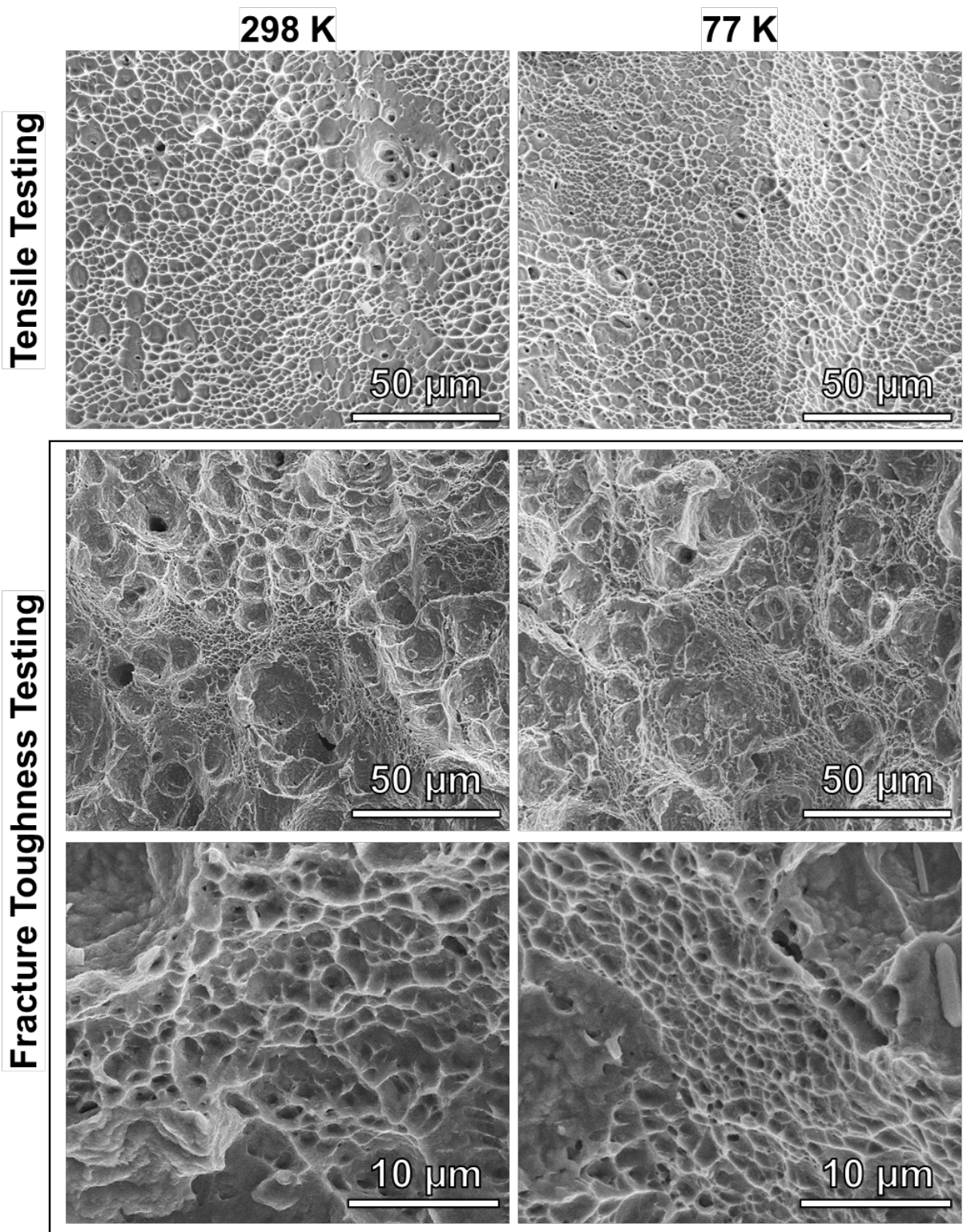
Supplementary Figure 2: Composite of SEM images showing the microstructure through the thickness of the forged and annealed workpiece. Dark areas are bands of recrystallized grains. The local recrystallized fraction was generally higher near the center of forging.



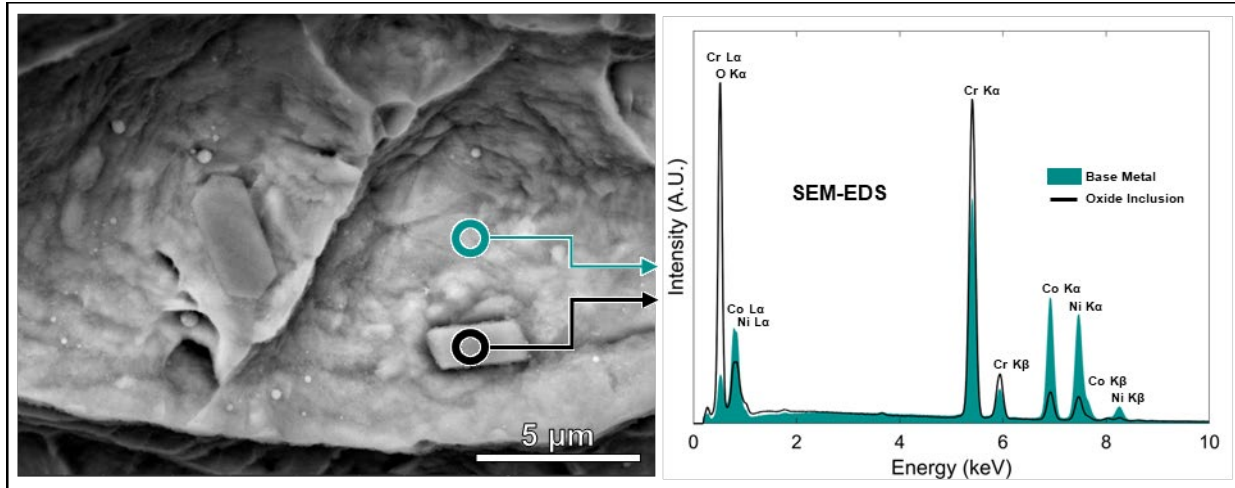
Supplementary Figure 3: XRD results from the forged and annealed workpiece showing a single-phase, face-centered cubic structure.



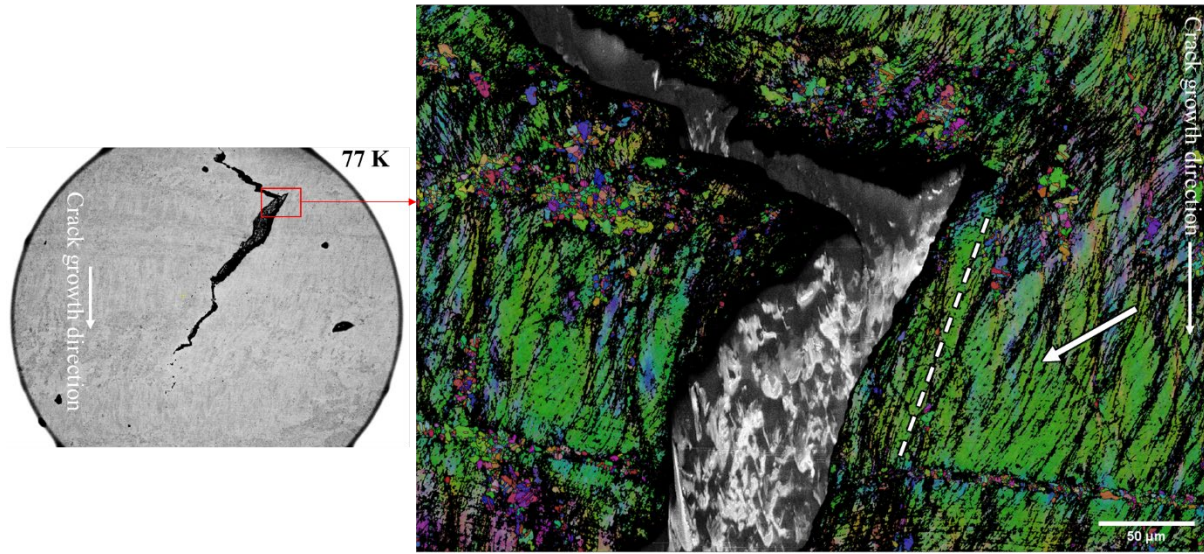
Supplementary Figure 4: Images showing the microstructure around the crack and the fracture surface of a C(T) sample tested at 77 K that apparently exhibited unstable crack growth followed by stable crack growth. Note that this figure compiles other images from this manuscript. (a) Fracture toughness testing results showing data at larger crack extensions than Figure 2. (b,c) LOM images of the crack path. (d) SEM overview of the crack path near the tip. (e) Higher-magnification orientation image map showing grain orientations around the crack tip. (f) Optical microscopy overview of the fracture toughness specimen after testing to failure. (g,h) SEM images showing ductile fracture at different locations along the crack.



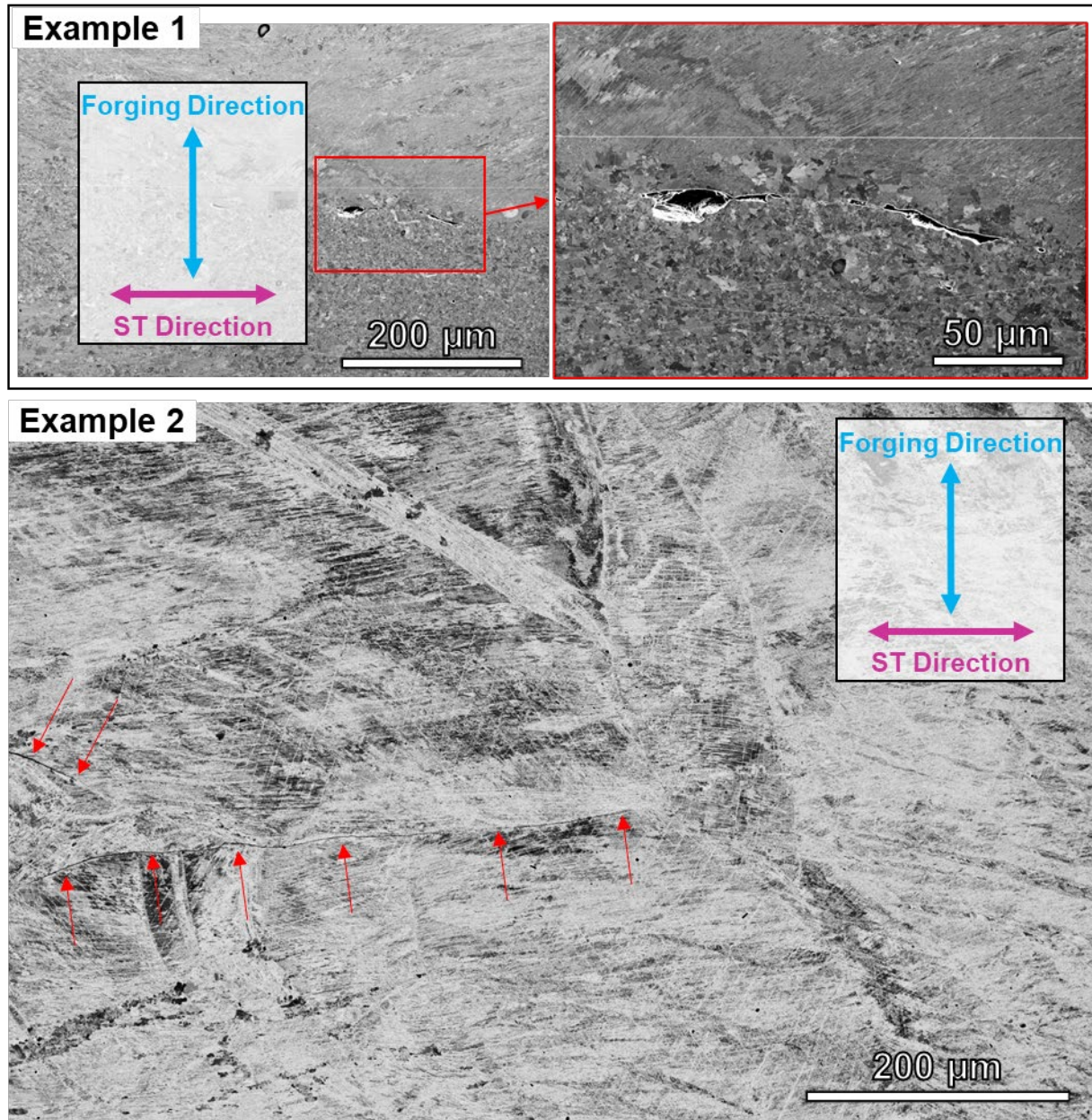
Supplementary Figure 5: Fracture surfaces of test specimens after tensile testing and fracture toughness testing.



Supplementary Figure 6: SEM-EDS showing the presence of representative chromium-rich oxide inclusions on the fracture surface of a C(T) specimen.



Supplementary Figure 7: Overview SEM image and SEM-EBSD image showing crack deflection at the interface between an RX and n-RX region. The crack appears to preferentially propagate on or parallel to pre-existing deformation twins in the n-RX region. The deformation twins appear as thin black lines in the SEM-EBSD image (see example indicated by white arrow). The dashed white line indicates the approximate projection of the twinning plane.



Supplementary Figure 8: Examples of forging cracks in the microstructure.