**Supplementary material**

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Fig. A.1. BSE images of the deformed single crystal of pyrope-rich garnet (M643). (a) A whole view of the deformed single crystal. The white arrowhead indicates pure-shear deformation geometry. (b) Close-up of area B in the image (a). The targeted band for ECCI and TEM is indicated by the arrowhead. (c) EBSD crystal orientation map (color-coded texture component map) showing bulk intracrystalline distortion, consistent with the contrast in BSE images. The rainbow scale (degree) shows the deviation (or misorientation) from the reference orientation which is marked with a yellow square in the map. The white rectangular area corresponds to the area (b).