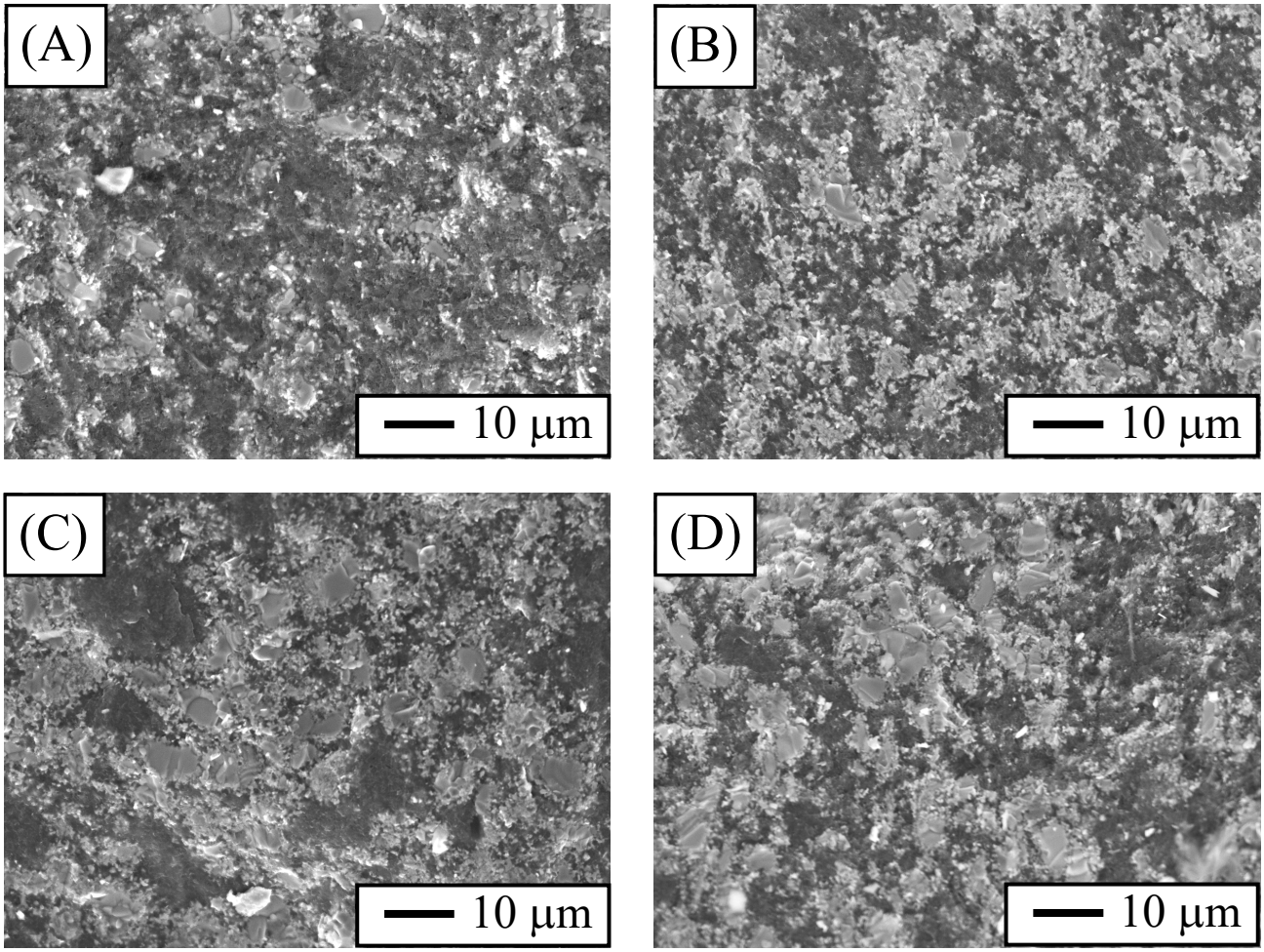

Figure SI1. Low-magnification SEM image representative of the fracture surface of (A) Comp-B_4C-35%$MoSi_2$, (B) Comp-B_4C-40%$MoSi_2$, (C) Comp-B_4C-45%$MoSi_2$, and (D) Comp-B_4C-50%$MoSi_2$. Imaging was done with secondary electrons at 15 kV. Note the greater relative abundance of Si/Mo-rich second phases (whiter and lighter-grey phases) with increasing proportion of $MoSi_2$ aids.

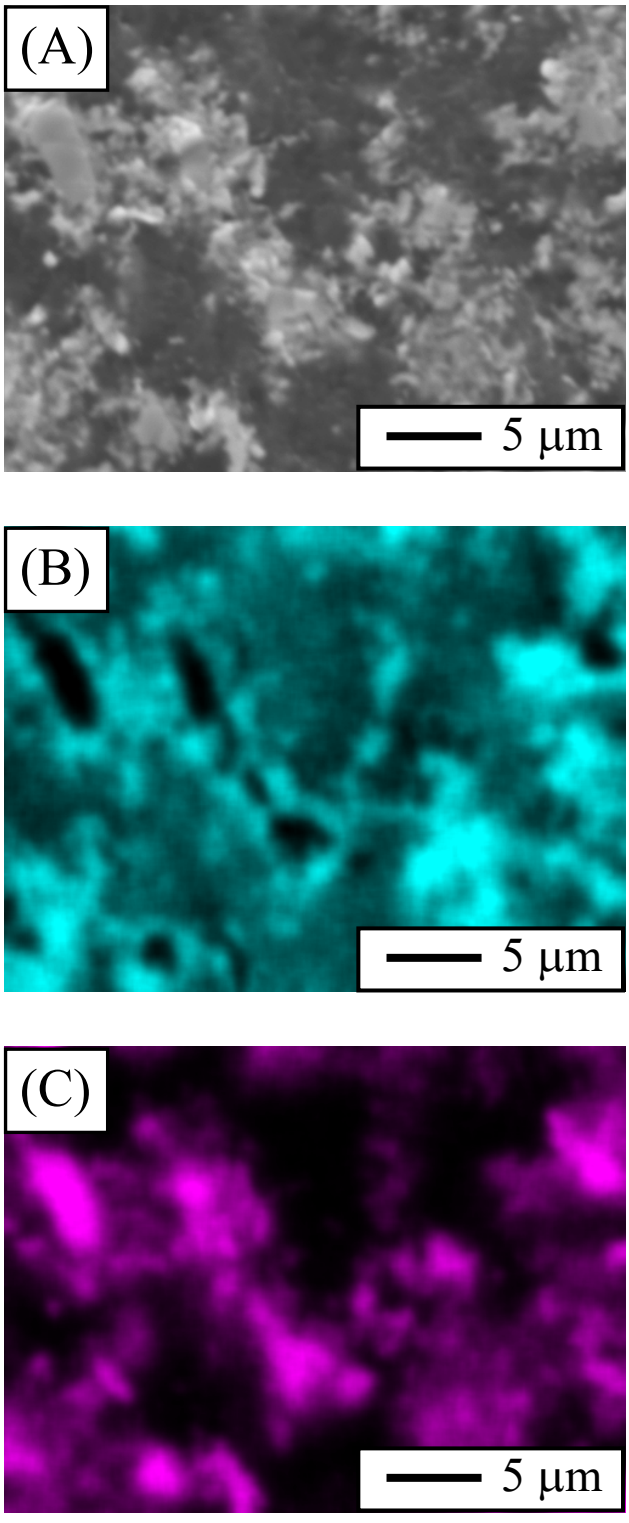

Figure SI2. (A) Moderate-magnification SEM image representative of the fracture surface of Comp-B_4C-40%$MoSi_2$, and the corresponding elemental composition maps of (B) Si and (C) Mo obtained by EDS. SEM/EDS imaging was done with secondary electrons/characteristic X-rays at 15 kV. Note that the whiter and lighter-grey phases in the SEM image are Si/Mo-rich second phases.

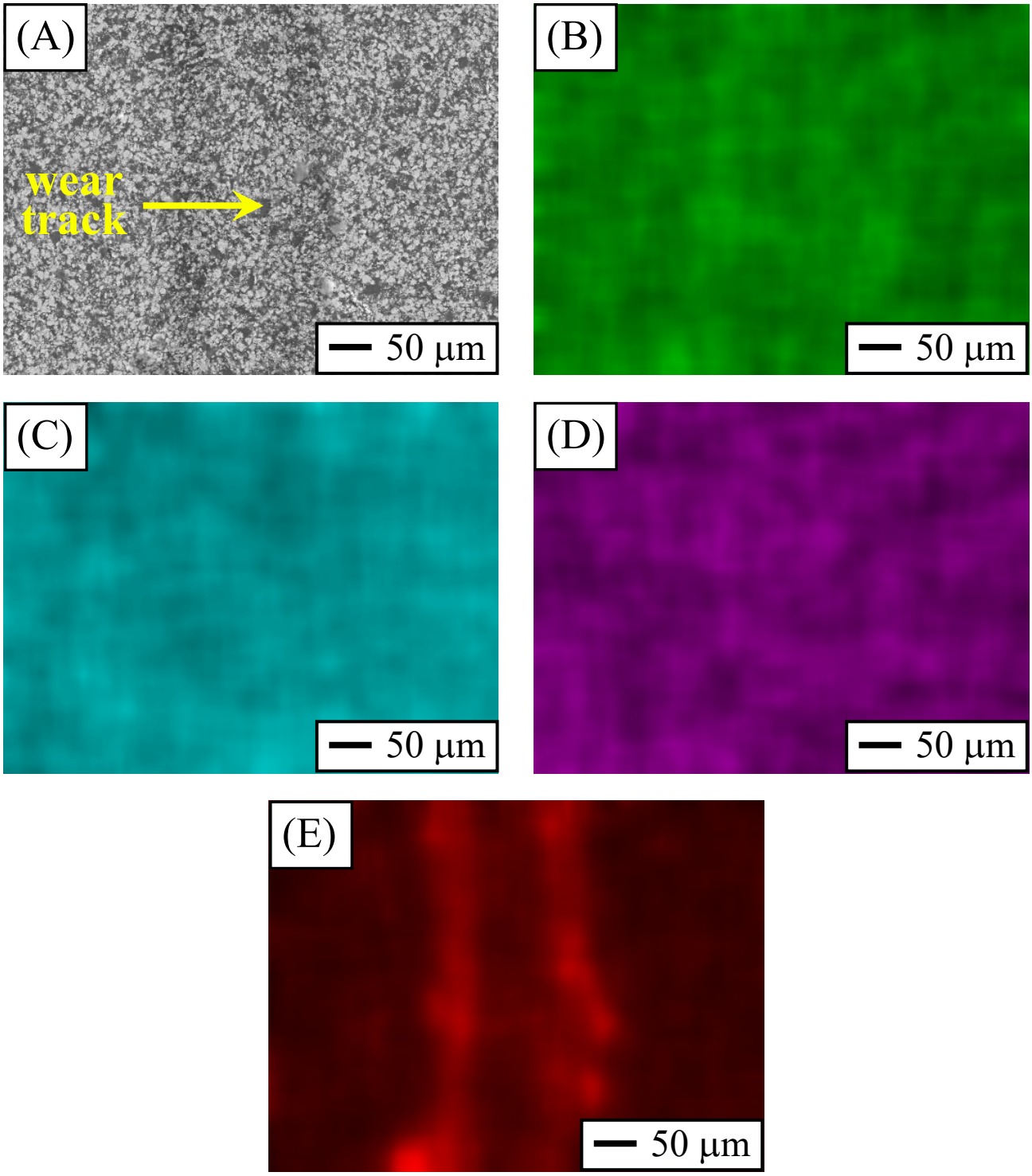

Figure SI3. (A) Low-magnification SEM image representative of the wear track on Comp-B_4C-40%$MoSi_2$, and the corresponding elemental composition maps of (B) C, (C) Si, (D) Mo, and (E) O obtained by EDS. SEM/EDS imaging was done with secondary electrons/characteristic X-rays at 15 kV, at the conclusion of the wear tests. Note that the EDS mapping indicates that an oxide tribolayer was formed at the inner contour of the wear track.

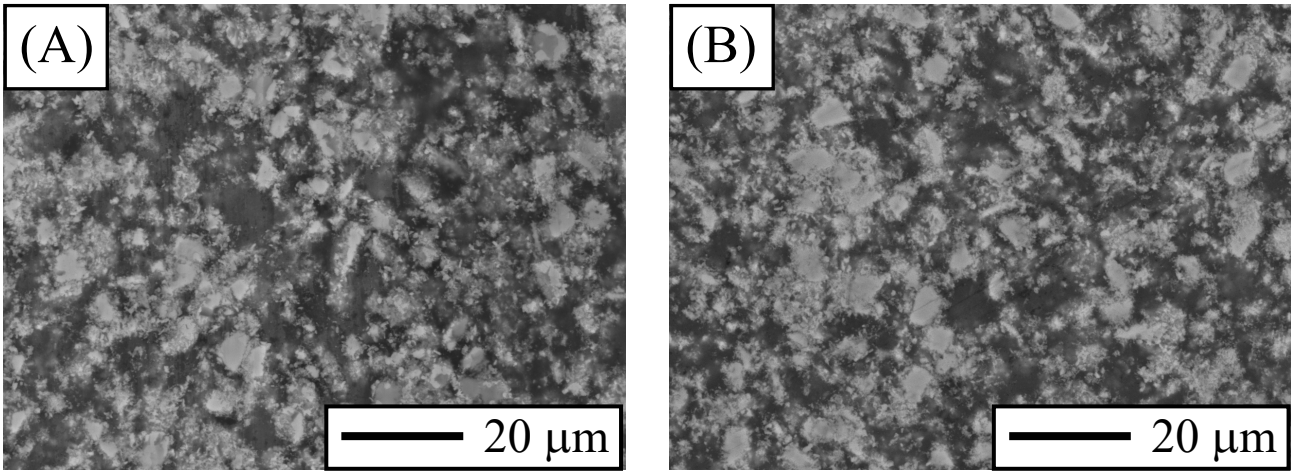

Figure SI4. Moderate-magnification SEM images (A) inside and (B) outside the wear track. SEM imaging was done with secondary electrons at 30 kV at the conclusion of the wear tests. Note that, for the sake of comparison, Fig. S4A is the same as Fig. 4E. Note the similarity of the microstructure in the unworn and worn surfaces.