Electronic Supplementary Material (ESI) for Nanoscale.

Compositional defects in MoAlB MAB phase thin film grown by high-power pulsed magnetron sputtering

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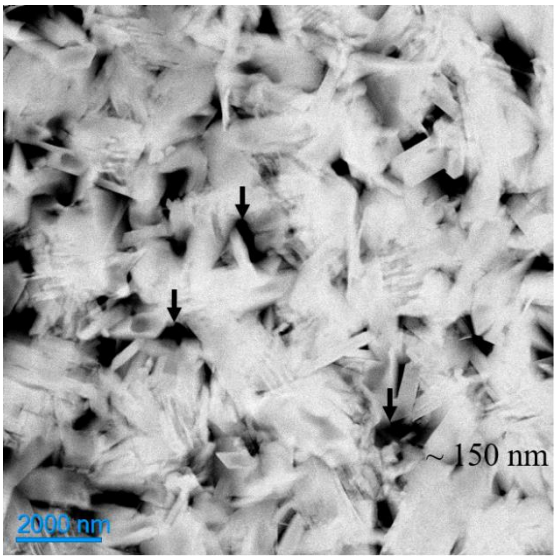

Figure. S1: Plan view STEM image of DC magnetron sputtering MoAlB thin film.

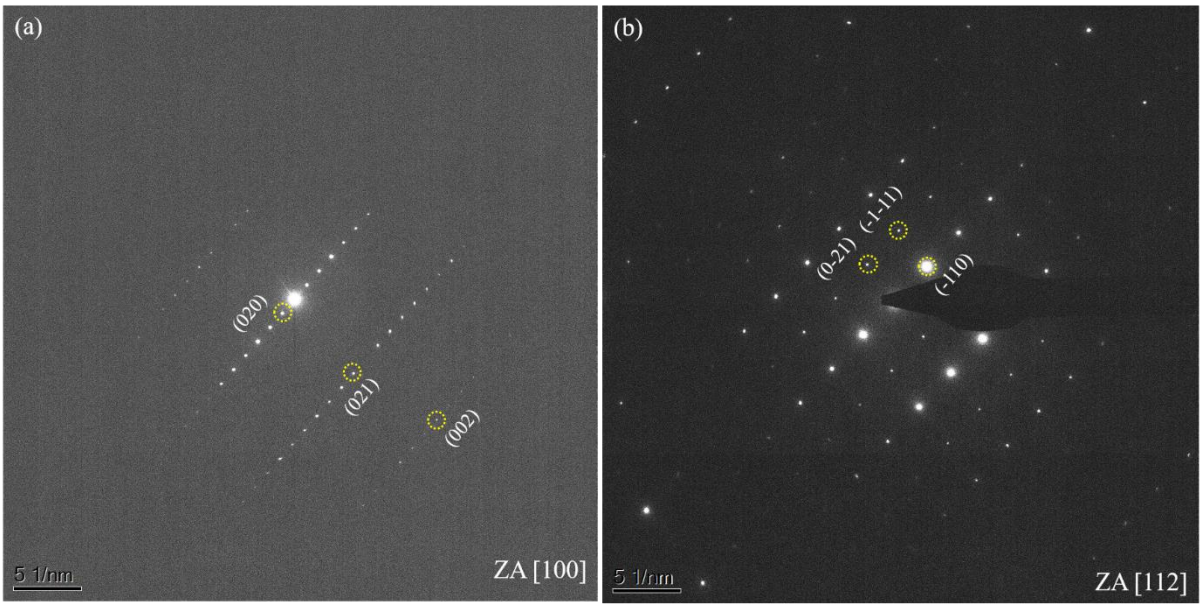

Figure. S2: (a)-(b) Selected area diffraction of as-deposited MoAlB thin film.

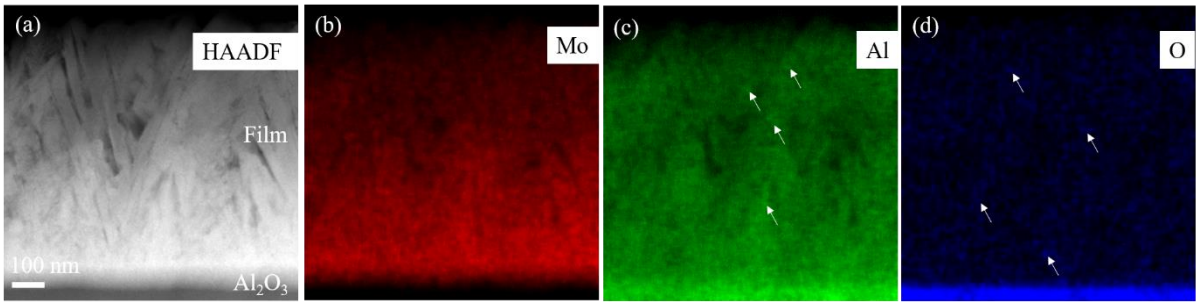

Figure. S3: Elemental composition of MoAlB (a) is shown in (b)-(d). Al-rich (c) and O-rich (d) impurity phases are marked by white arrows.

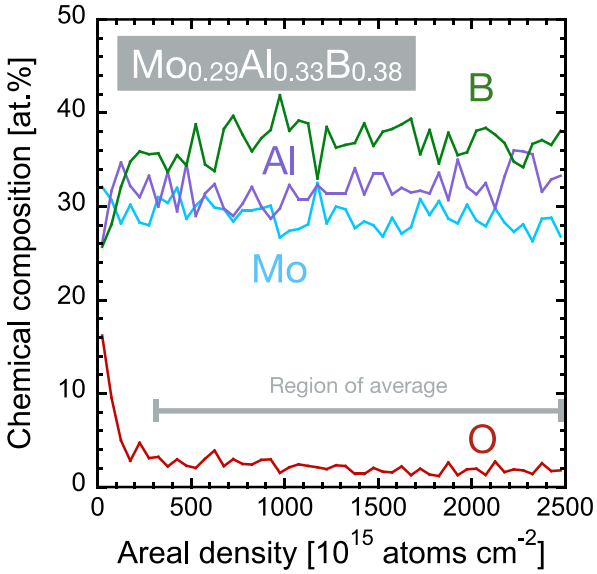

Figure. S4: ToF-ERDA depth profiling of as synthesized MoAlB thin film.

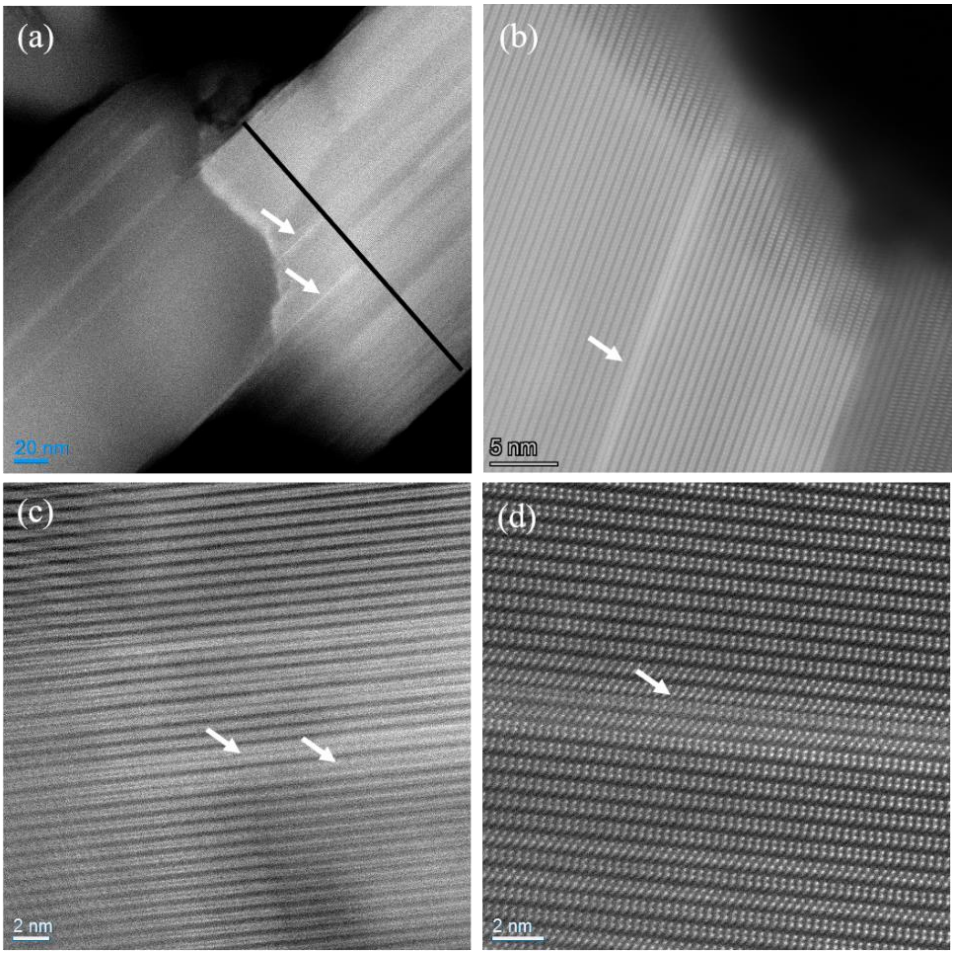

Figure. S5: (a)-(d) STEM images of compositional defect phase $Mo_4Al_3B_4$ (marked by white arrows) from different grains. (a) is used to calculate defect fraction of $Mo_4Al_3B_4$ inside MoAlB matrix.

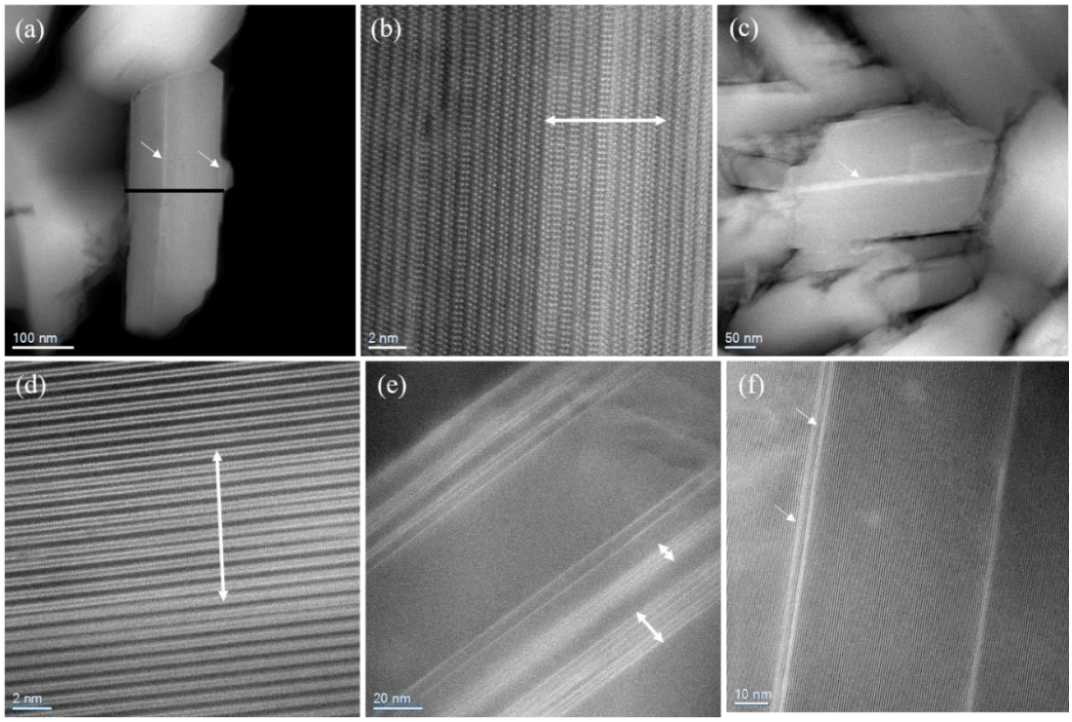

Figure. S6: (a)-(f) HAADF STEM images of compositional defect phase $Mo_6Al_5B_6$ (marked white arrows). (a) is used to calculate defect fraction of $Mo_6Al_5B_6$ inside MoAlB matrix.

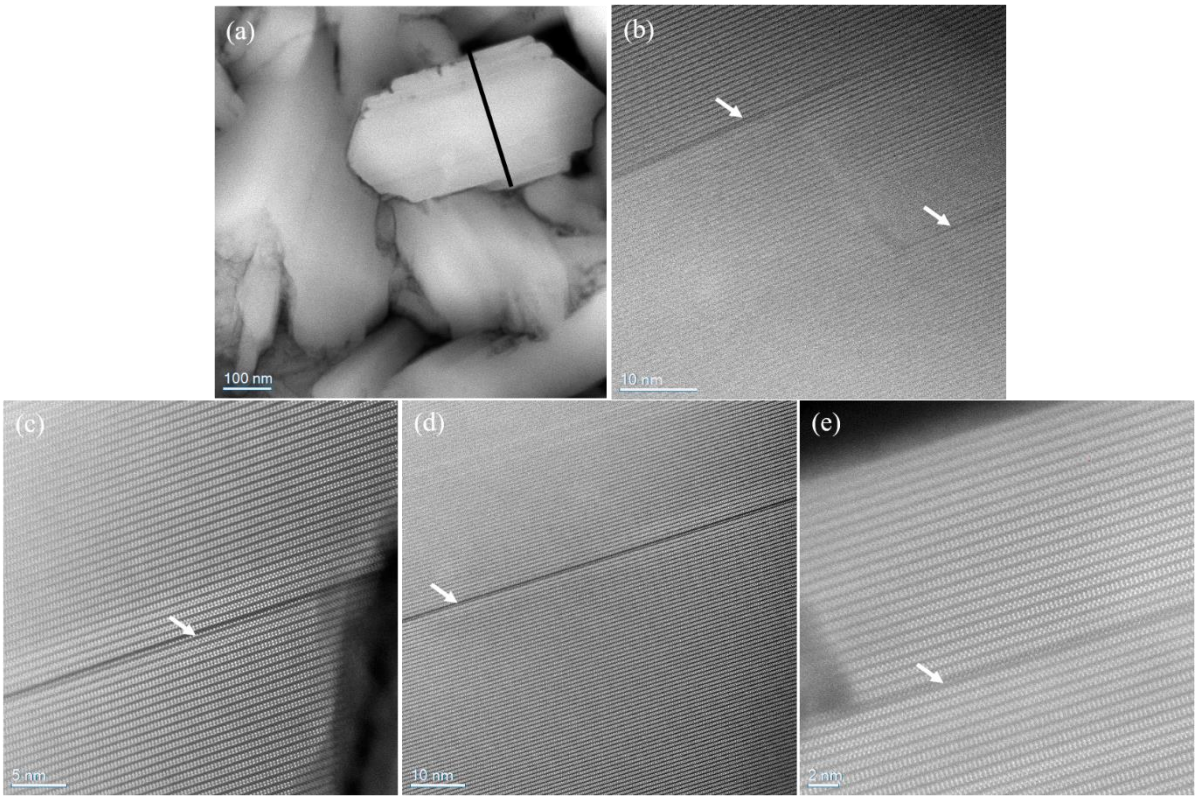

Figure. S7: (a)-(e) HAADF STEM micrographs of molybdenum aluminate (marked by white arrows) from different grains. (a) is used to calculate defect fraction of Al_3Mo inside MoAlB matrix.

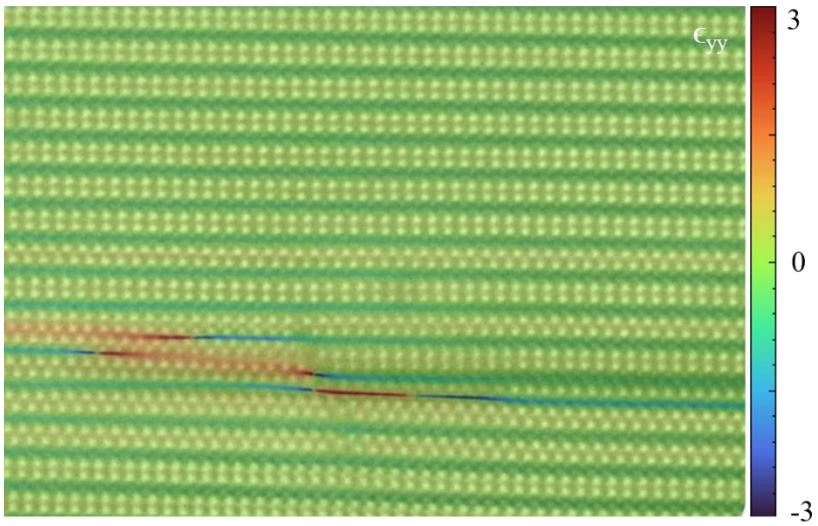

Figure. S8: Lattice distortion mapping along ϵ_{yy}.

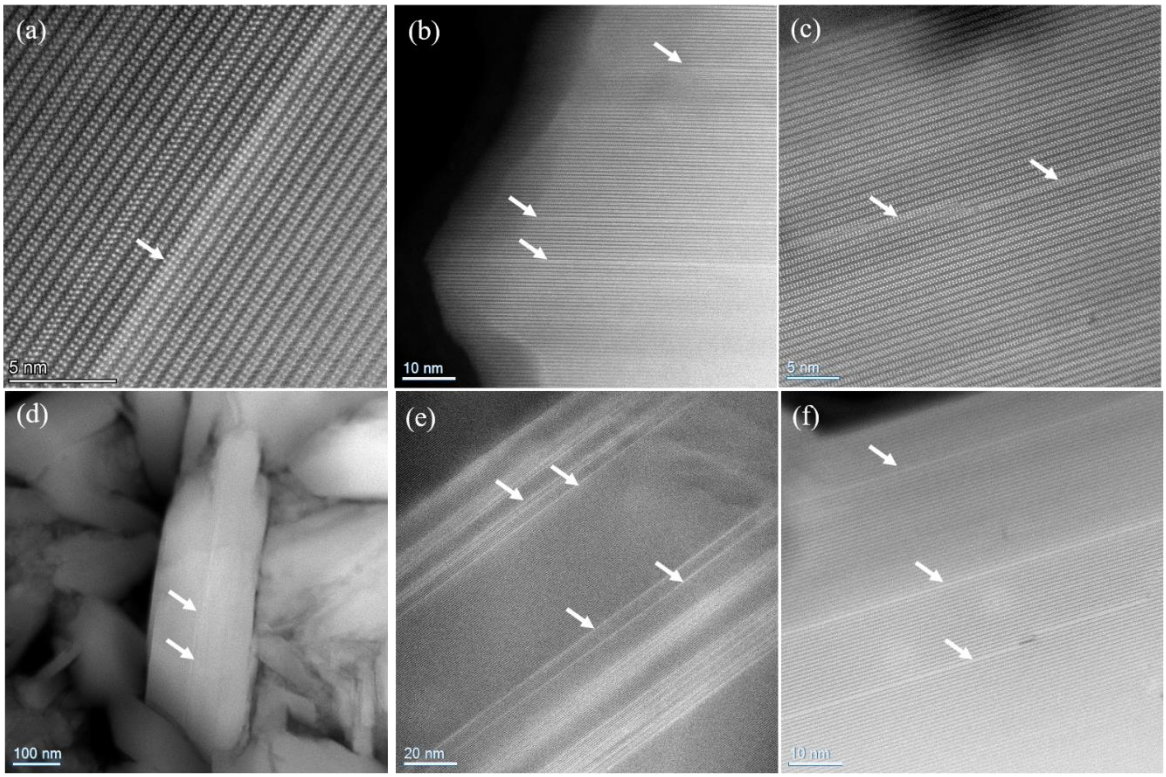

Figure. S9: (a)-(f) HAADF STEM images of compositional defect phase $Mo_3Al_2B_4$.

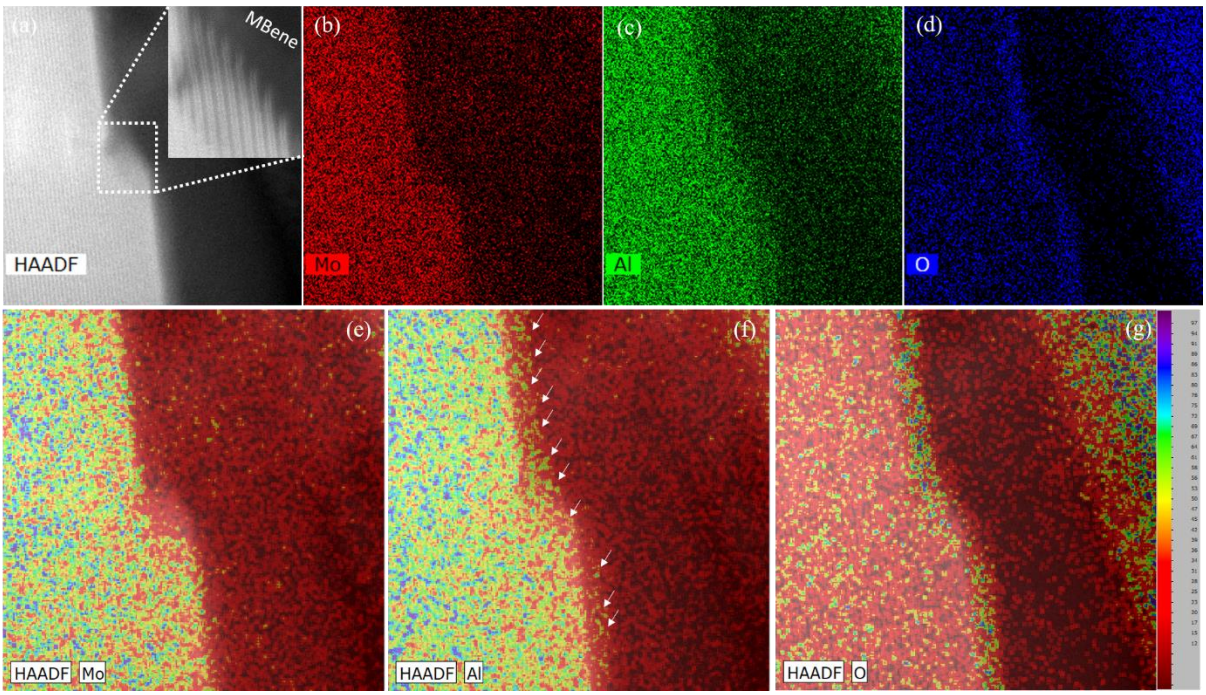

Figure. S10: (a) HRSTEM of 2D MoB MBene formation at grain boundary. (b)-(d) show elemental mapping of Mo, Al and O by STEM EDX. (e)-(g) present intensity distribution of the elemental maps.

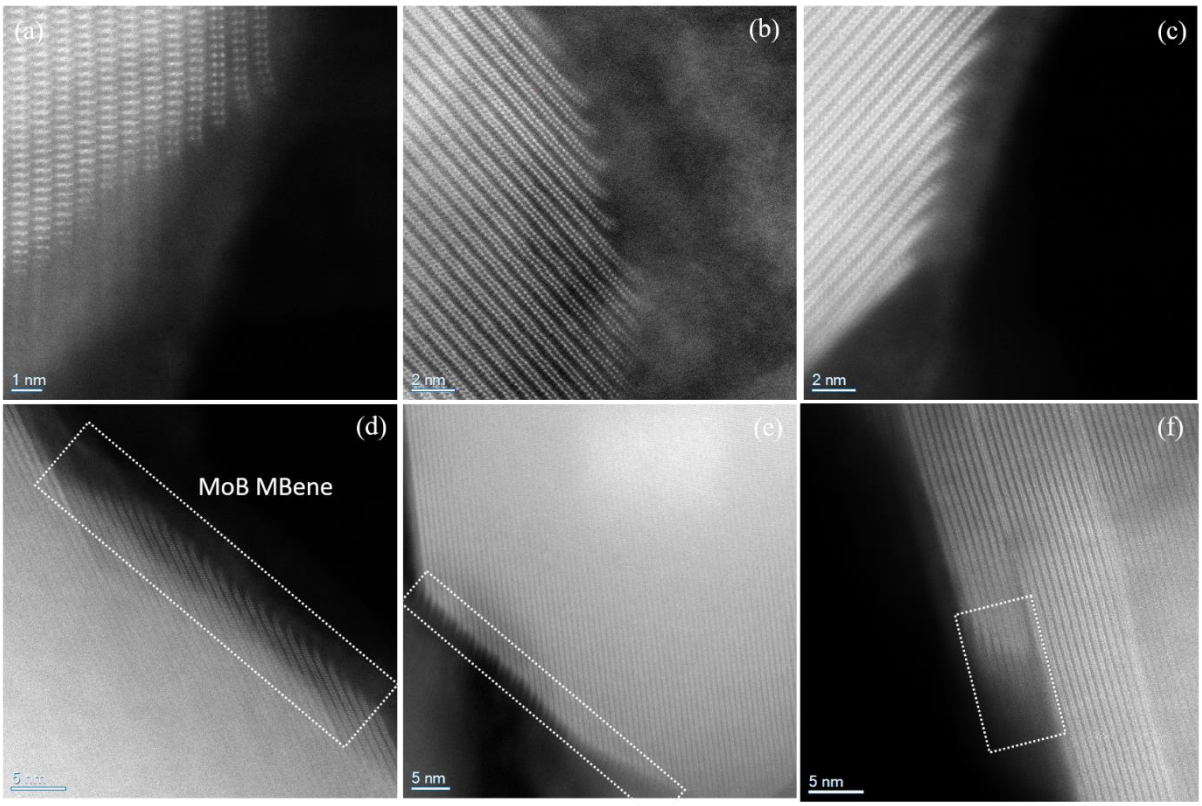

Figure. S11: (a)-(f) HRSTEM images of 2D MoB MBene form different MoAlB grains.