Wide bandgap (WBG) power semiconductors, including silicon carbide (SiC) and gallium nitride (GaN) promise transformative changes in energy conversion and power management electronics for a wide range of terrestrial and space applications [1]. Unlike silicon, large-scale commercialization of WBG power devices is significantly hindered by excessive material defects which cause poor wafer yield, degraded field-reliability and severe performance de-rating [2, 3]. This paper will provide an in-depth discussion of current state-of-the-art and emerging breakthroughs in WBG material and device technologies in order to “unlock” enormous potential for post-silicon energy conversion and power management applications.

