# Structural Defects in SiC bulk and Epilayers

Soon-Ku Hong
*Department of Materials Science and Engineering, Chungnam National University, Daejeon 34134, Korea*

SiC is one of the hottest compound semiconductors, currently, because of technological developments of high quality single crystal bulk, commercialization of large size (up to 8 inches) 4H-SiC substrates and epitaxial wafers, advances in fabrication of SiC-based various power devices, and industrial applications of such devices in electrical vehicles.

However, structural defects in SiC bulk (substrates) and epitaxial wafers are still importnat issues to ensure performances as the devices for high power and high voltage operations are highly required.

The structural defects in SiC substrates and epitaxial wafers are micropipe (hollow-core screw dislocation), threading dislocations (screw, edge, and mixed), basal plane dislocations), Shockley-type stacking faults, Frank-type stacking faults, and so called carrot defet. In fact the carrot defect is complex stacking fault defect composed of threading dislocation, prismatic stacking fault, basal Frank-type stacking fault and stair-rod dislocation (Lomer-Cottrell dislocation). Stacking faults are inevitably bounded by partial dislocations also. Therefore, as described above almost structural defets in SiC materials are strongly and directly related to the DISLOCATIONS.

Therefore, in this short course, dislocation topics for SiC studies are addressed in the first chapter. Among the lots of theories and fundamental concepts in dislocations, essential topics that are directly needed to understand behaviors and characteristics of the structural defects in SiC are carefully selected and discussed in the second chapter. Next, specular structural features of 4H-SiC and stacking fault issues are touched in the second chapter. Through these two chapters the audiences are prepared to understand most of important phenomena of the structural defects in 4H-SiC. The third and fourth chapters are now build on the knowledge from chapter 1 and 2 and will discuss the defect related issues in PVT SiC bulk (chapter 3) and CVD epilayer (chapter 4).