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High-purity germanium crystal growth for DUSEL experiments

WENCHANG XIANG, YONGCHEN SUN, DONGMING MEI, YUTONG GUAN, CHAO ZHANG, The University of South Dakota, CUBED TEAM — High-purity Germanium single crystals can be fabricated into ultra-low background detectors for dark matter and neutrinoless double-beta decay experiments at DUSEL. If the crystals are grown in underground environment, the cosmogenic production can be minimized and hence the crystals can be ultra-pure for the next generation experiments at DUSEL. Growing high-purity germanium crystals represents one of the most difficult tasks in semiconductor field. We adopt Czochralski method in growing single crystal in order to understand various technical challenges. With the pioneers' work done in the past, we are moving rapidly toward growing high quality single crystals on the surface. With the available valuable papers and accumulation of the growing experience, our growing process is being improved on weekly basis. This paper will report the grown crystals produced by our equipment and address versions issues with the growing processes.

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