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Investigation of Asymmetric Impacts on Protective Head Gear using the Large Chamber Scanning Electron Microscope KRISTINA MEDERO, EDWARD KINTZEL, Western Kentucky University — This study will interrogate the effect of asymmetric impacts on gridiron football helmets using the Large Chamber Scanning Electron Microscope (LC-SEM). As new materials are developed, the ability to predict and test in "real world" collisions is key to maximum protection of the athlete. Materials that compose the headgear are put under conditions of extreme stress, and after multiple collisions, must maintain their integrity. Better understanding of the damage caused by the impact vibrations is key to developing a strategy to reduce the number of injuries. Controlled impacts utilizing standard issued football helmets made of polycarbonates, and carbon fiber composite were carried out in air using a pendulum apparatus. Subsequent measurements were performed using the LC-SEM in variable pressure mode to interrogate changes to the helmet surface structure. Results of this investigation will show the progression of changes in the surface due to multiple impacts. This study may provide new insights for developing novel materials and helmet architectures for improved protective headgear in sports. Although numerous recent studies exist on improved safety in athletics, this project will explore these impacts from a unique perspective.

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