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Ceramic Microchannel Plates with Angular-Biased Channels--Synkera Technologies, Inc., 2021
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DOE Grant No. DE-FG02-04ER84087
Amount: \$99,984

Microchannel plate (MCP) detectors with advanced performance are needed for the high energy and nuclear physics experiments. Conventional glass fiber MCP technology has reached its fundamental limits in spatial and temporal resolution, signal-to-noise capability, high-count rate capabilities, yield and reproducibility, stability and lifetime. Alternative approaches are needed to overcome these limitations. This project will develop technology for fabricating MCPs from micromachined, self-organized nanoporous anodic alumina with advanced morphology. The approach would enable the low-cost, high-volume production of ceramic MCPs with sub-5 μm angular biased channels, 1:60 aspect ratio, open area ratio over 80%, arbitrary channel shape, precise channel registration, and chemical composition tuned to enable advanced performance for different spectral bands. Phase I will demonstrate the feasibility of enabling angular channel bias in ceramic MCPs by micromachining nanoporous ceramics with advanced morphology.

Commercial Applications and Other Benefits as described by the awardee: Ceramic MCPs could be used to replace glass MCPs in detectors for scientific instrumentation, biomedical imaging, satellite mapping, and reconnaissance; as well for night and low-light-vision and imaging devices for law enforcement, military, counterterrorism, and consumer applications.