### **19-3. Radiation Detection Using Passive Surface Acoustic Wave (PSAW) Sensors**

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As humans venture to the Moon and beyond, the need for a small, highly sensitive and fast- responding radiation detection device is needed. Research conducted at KSC in collaboration with the University of Central Florida (UCF) and the small business Pegasense investigated the utilization of Passive Surface Acoustic Wave sensors (PSAWs) for radiation monitoring. PSAWs offer advantages over traditional methods of radiation monitoring techniques because of their low cost, compact size, high sensitivity and immediate response times. When coated with a polymer that changes its physical properties when exposed to radiation, it should be possible to detect radiation flux and dose rates using PSAWs. The experiment consisted of 10 wafers each supporting 64 PSAWs upon which a surface coating of Polymethylmethacrylate (PMMA) was applied. The sensors were exposed to a proton beam of varying energetic particle count and strength. Unfortunately, due to the world’s pandemic shutdown, the polymer coated PSAW sensors were compromised during testing and the results detailed herein are inconclusive. Further research is required to vet the concept, but preliminary results show that PSAWs can be coated with a thin film polymer coating and still function. Prior NASA research shows that radiation exposure of PMMA does compromise the polymer’s physical condition and functioning PSAWs should be able to detect a physical change of the polymer. With their compact size, high sensitivity and fast response times, PSAWs still have the potential to usher in a new method of radiation monitoring that can be implemented in Earth-based applications as well as in deep-space exploration endeavors.