The MFC or Macro Fiber Composite was invented at NASA Langley Research Center during the end of the 90’s. Smart Material began to commercialize the MFC under a US government license in 2003. The MFC is a member of the family of Advanced Low Profile Actuators (ALPA) and is based on piezo ceramic fibers. Due to its excellent properties like flexibility, anisotropy and long-term stability, the Macro Fiber Composite is used as an actuator, as a strain sensor for vibrations, and as a kinetic energy harvester.

This paper gives a brief overview of recent improvements of the MFC and developments of using the MFC for energy harvesting applications and haptics. It presents newer results of the energy harvesting fish tag project at Pacific Northwest National Laboratory, which the authors briefly presented during the ISPA 2017 and recent developments of improving the MFC actuator properties, to allow for a low voltage, high strain actuators as demanded by many new consumer applications. The paper will present actual data of MFCs using single crystal, PMN-PT. The paper will discuss future work in using textured ceramics, a development spearheaded at PennState University, as a cost effective alternative for the still very expensive single crystal materials for energy harvesting and actuator applications.