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Integrated Printed Moisture Sensors in Composite Structures
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— Moisture that is present in the ambient environment can break down composite structures, such as boats and aircraft, if they are subject to extended exposure. Therefore, these effects need to be monitored over the lifetime of the structure. We are attempting to do this by producing a moisture sensor that can be integrated into composite structures and have little impact on the structural integrity. To achieve a thin sensor, both printed electronics and nanotechnology were utilized. An open circuit was printed on polyimide (PI) using Ag nanoparticle ink. For some sensors, bucky paper (BP) was laid on top using acetone to flatten it, and on the others carbon nanotube (CNT) ink was printed on top of the Ag printed network. The samples were sintered and testing began in a Controlled Environment Chamber (CEC). We hypothesized that resistance would increase with increasing humidity because the water would impede current in the circuit. This is what occurred in the BP sensors; however the CNT printed sensor displayed the opposite behavior. We are currently looking into why printed materials exhibited opposite behaviors.

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