GRADUATE STUDENT RESEARCH SEMINAR SERIES (2019)

DESIGN OF A FLEXIBLE AUTOMATED ULTRASONIC-ASSISTED SOLDERING SYSTEM TO INVESTIGATE INTERACTIONS BETWEEN PROCESS PARAMETERS TO IMPROVE GLASS SOLDER JOINT QUALITY

SPEAKER: JENNIFER SHAFFER BROWN

As many industries seek to eliminate the use of flux when joining dissimilar materials, ultrasonic-assisted soldering (UAS) has shown potential to replace conventional soldering to improve wetting at bonded joint surfaces. A challenge that UAS must overcome before it can be considered a viable replacement is that its techniques must be transferrable to the industrial scale. In the past two years, we have designed and constructed a modular, open-sourced system that allows for flexible experimentation of the UAS process. By controlling process parameters such as solder tip speed, applied ultrasonic power, tip distance from substrate, and extrusion rate of the solder onto the substrate, this system will allow us to better understand how the UAS process affects different solder-substrates systems with the goal of optimizing solder quality. This presentation will primarily focus on the evolution of the automated UAS system with relevant background information on the process and then present some preliminary results and conclusions from initial solder quality testing with glass substrates, which includes shear strength and interfacial porosity. Future work involves the addition of nanoparticle reinforcements to the solder to study how UAS processing of these nanoparticle-reinforced active solders affect several key solder joint characteristics such as shear strength and interfacial porosity.

MONDAY, SEPTEMBER 16 3:00 PM

EIB 132