GRADUATE STUDENT RESEARCH SEMINAR SERIES (2021)

EFFECTS OF PROCESSING PARAMETERS ON ULTRASONICALLY-SOLDERED GLASS JOINTS

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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 this research, 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 allows us to better understand how the UAS process affects the bonding of active solder-glass joints with the goal of improving joint quality and reliability. This presentation will briefly introduce the automated UAS system and then present some results from glass-solder joint quality tests, including shear strength and interfacial porosity. Future work involves fabricating thin film microsensors directly on glass substrates to measure the temperature and strain evolution under the soldering tip during the UAS process to investigate the effects of temperature and pressure on the solder-glass bonding.

MONDAY, FEBRUARY 15 3:00 PM

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