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# Simulating Interconnects in Microchips for the Purpose of Rapid Failure Analysis

As electronics become more compact, the issue of electromigration, the accumulation of atoms at the anode of an electronic circuit due to an uneven distribution of current, becomes more prevalent. Devices that undergo electromigration experience physical changes often resulting in short or open circuit failures specifically at the soldering joints. With electronics becoming smaller, and soldering joints following suit, the issue of electromigration magnifies and the need for a solution increases. Present methods for electromigration testing are unfavorably costly, making frequent and long-term testing problematic. In addition, current technology is not flexible and adaptable to different testing methods including parallel testing.

Researchers at ASU have effectively created a fixture to test for electromigration effects in solder materials applicable to microelectronics. The fixture can aid in creating soldering joints on the scale of 50 micrometers in diameter as well as being able to run several additional tests in tandem. The design features two blocks of metal with miniscule pegs at the endpoints. The pegs are variable in size and they control the diameter of the solder bumps formed, making it simple to mimic actual solder bumps. The pegs are easily aligned, including the gap between the pegs to allow controllable solder reflow. This control over the gap size gives the user power to maintain the system when the solder cools making sure the effects of thermal contraction are minimized. The fixture accommodates electrical and mechanical testing.

Potential Applications

- Microelectronics testing
- Semiconductor applications
- General electromigration mitigation

Benefits and Advantages

- Quicker, Lower Cost Testing – the process accommodates multiple solders and finishes without any special changes to the fixture
- Efficient - the fixture makes it possible to run frequent tests in tandem and with many different configurations; the design has the ability to provide individual data for each junction while continuing to maintain the size of that junction in-line with the application junction size
- Precise – the fixture can be used to produce solder joints on the scale of 50 microns in diameter making it 2x smaller than related technologies

For more information about the inventor(s) and their research, please see

Blake Roger's directory webpage

Dr. Amaneh Tasooji's directory webpage