

Center for Integrative Materials Joining Science for Energy Applications (CIMJSEA)

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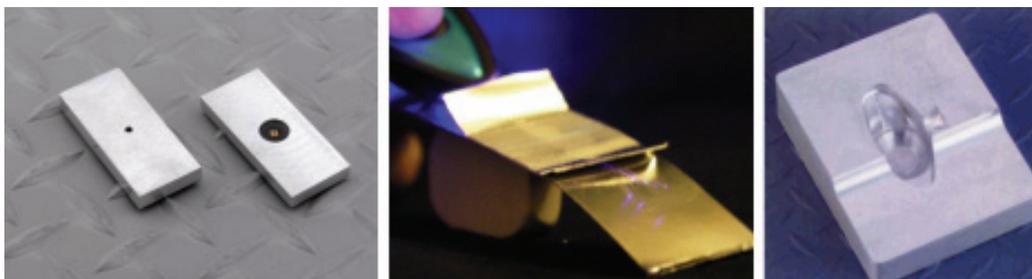
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Very High Power Ultrasonic Additive Manufacturing for Energy Applications

Next generation power plants have been designed to operate at higher temperatures to improve efficiency. To further improve efficiency, advanced cooling methods are needed. This requires complex heat exchanger designs with unique thermal characteristics. A new manufacturing process, Very High Power Ultrasonic Additive Manufacturing (VHP UAM) has demonstrated the ability to fabricate these complex shapes. In addition, VHP UAM is an approach to manufacturing that is capable of embedding sensors into finished parts. These sensors can then be used to reduce costly down time by monitoring process and structure parameters that add condition-based maintenance capabilities.



Potential hybrid examples: Embedded electronics, embedded fiber optics, and complex shapes.

VHP UAM uses a unique combination of ultrasonic energy and force to create complex metal structures with dissimilar materials. The breakthrough is that thin strips of metal(s) can now be more easily bonded to create an engineered structural component that has novel thermal, corrosion, and operational properties.

Economic Impact: VHP-UAM crosscuts many industries, including EWI and other CIMJSEA sponsors because it overcomes cost and geometry constraints typically associated with conventional bonding methods, such as explosion bonding, cladding, and brazing. The new process enables more cost effective engineering solutions that are essential for the next generation of efficient power plants. The ability to create complex parts, as well as embed sensors, will extend the lifecycle and significantly reduce the manufacturing costs of next generation power plants. A new

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business venture (Fabrisonics) has been launched to market this technology in collaboration with EWI and Solidica.

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