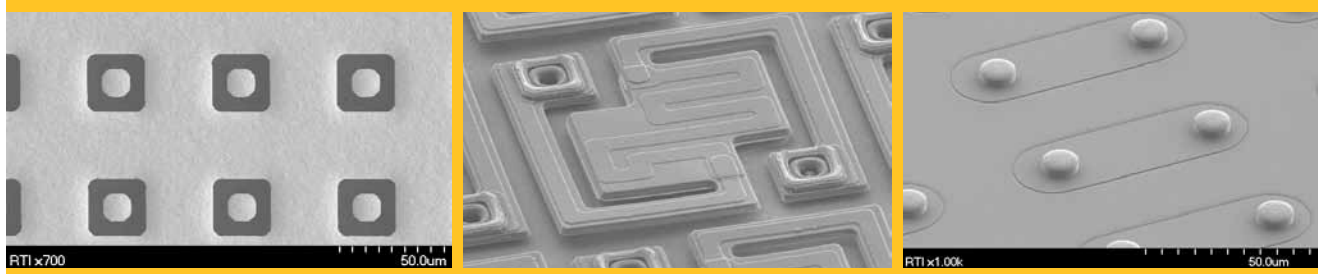


MICROSYSTEM INTEGRATION AND PACKAGING

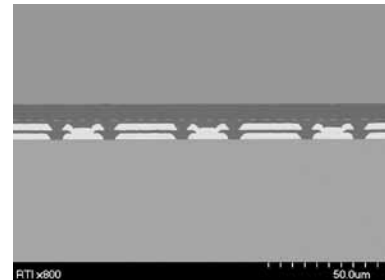
Post CMOS Wafer Processing



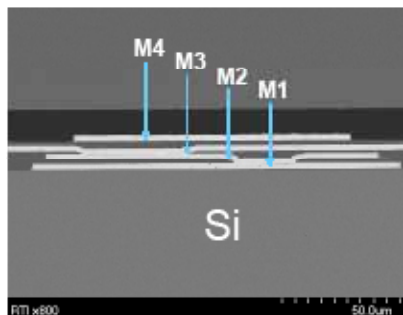
RTI International is a leader in the research and development of innovative materials, microstructures, and devices for Microsystem Integration and Packaging. RTI's extensive experience in back-end-of-line (BEOL) processing makes us an ideal partner for the development or implementation of post-CMOS wafer processes in the areas of multi-level metallization schemes, high density metal-metal interconnects for 3D integration, and monolithic device integration. Fully integrated fabrication and analytical facilities, staffed with full time engineers and researchers, allow RTI to support a diverse project base developing new technologies and solutions for our clients.

Multi-level Metallization

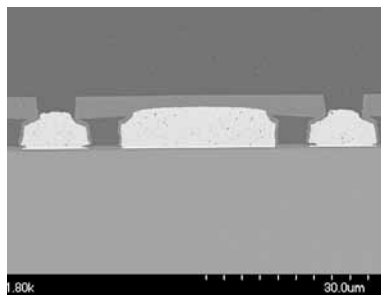
RTI has been developing and implementing multi-level metallization schemes for applications such as high power signal routing layers for read-in ICs and high performance computing. Schemes using inorganic dielectrics, organic dielectrics, or a combination of both inorganic and organic dielectrics for the interlayer dielectric have been employed.



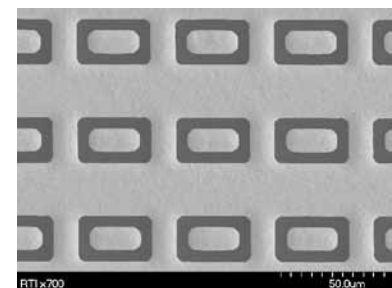
x-SEM of 2 metal layers with 2 planar organic ILD layers



x-SEM of 4-level metallization with inorganic ILD layers



1st level metallization with planarized interlayer dielectric passivation using combination of organic and inorganic dielectric

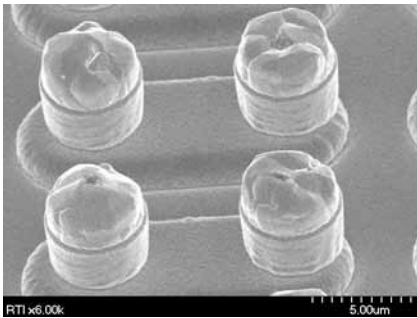


Plan view image of 1st metallization layer with smallest gap design rule



High Density Metal-Metal Interconnects for 3D Integration

As 3D integration technology becomes more prevalent, new methods of interconnecting devices with even smaller I/O pitches are required to support the unprecedented interconnect density. RTI has been developing metal-metal bonding interconnect technologies for 3D integration that utilize arrays of copper and copper-tin pads. The pads can be fabricated directly above existing device I/O pads or linked to the I/O pads via a redistribution layer. The arrays of pads are bonded together through diffusion processes and are used to form interconnects between two devices at pitches as small as 10 microns. The resulting interconnects are mechanically strong and thermally stable up to temperatures well above the thermal budget of ICs (> 400C). These interconnect structures can be applied to most IC wafers for high I/O density interconnection, chip stacking for 3D integration, Si-to-Si integration, and applications requiring thermal and mechanical stability at temperatures beyond that of typical solder materials.



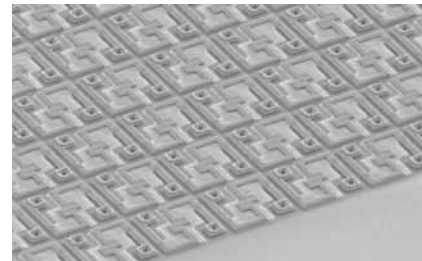
Cu/Sn pads on 10 µm pitch

Monolithic Device Integration

RTI can fabricate device structures directly on IC or passive substrate wafers. We can work collaboratively with you and your customers to transfer technologies and/or develop designs and processes for monolithic integration of structures.

Since 2002, RTI has been successfully fabricating pixelated, suspended bridge structures on IC wafers for an infrared scene projector application. The fabrication sequence

was originally part of a technology transfer to RTI, with the device structure being built using some nonstandard semiconductor device materials and processes. RTI successfully delivered several fully functional arrays from the technology transfer validation lot that met the customer's performance specifications. Over the years, continued process modifications and materials development work with the customer have led to improved pixel performance and yield, while enhancing our process and design knowledge for other monolithic device integration applications.



Tilt-view SEM image of suspended bridge structures fabricated at RTI

Working with RTI

RTI is a not-for-profit company and ITAR registered organization that offers a "safe harbor" development environment to its clients. We work with a diverse base of commercial clients, government agencies, and academic institutions, supporting our clients through application-driven technology development programs, custom prototyping, and small volume production. We also partner with external organizations for joint proposals in a variety of government and defense programs, including SBIR and STTR programs.

More Information

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