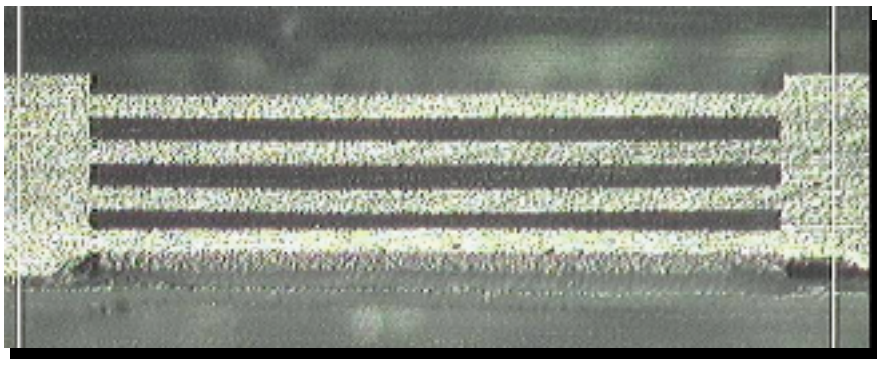
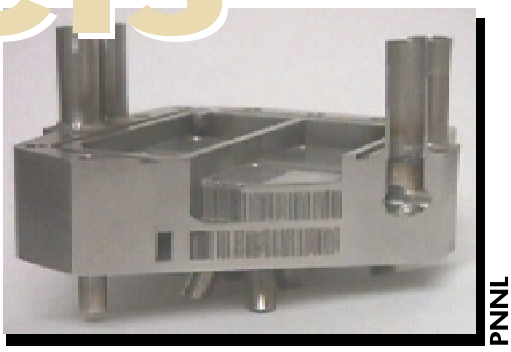


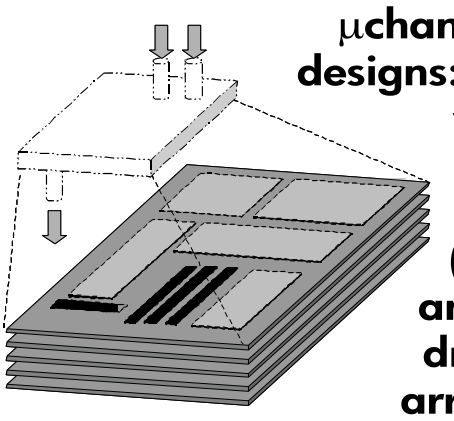
A high aspect ratio (35:1) microchannel array in NiAl possessing excellent high-temperature (> 800°C) corrosion resistance. Channel height is 80 μm.

μChannels



PNNL

μchannel array designs: gasoline vaporizer micro-system (above) & and system drawing of arrays (left).



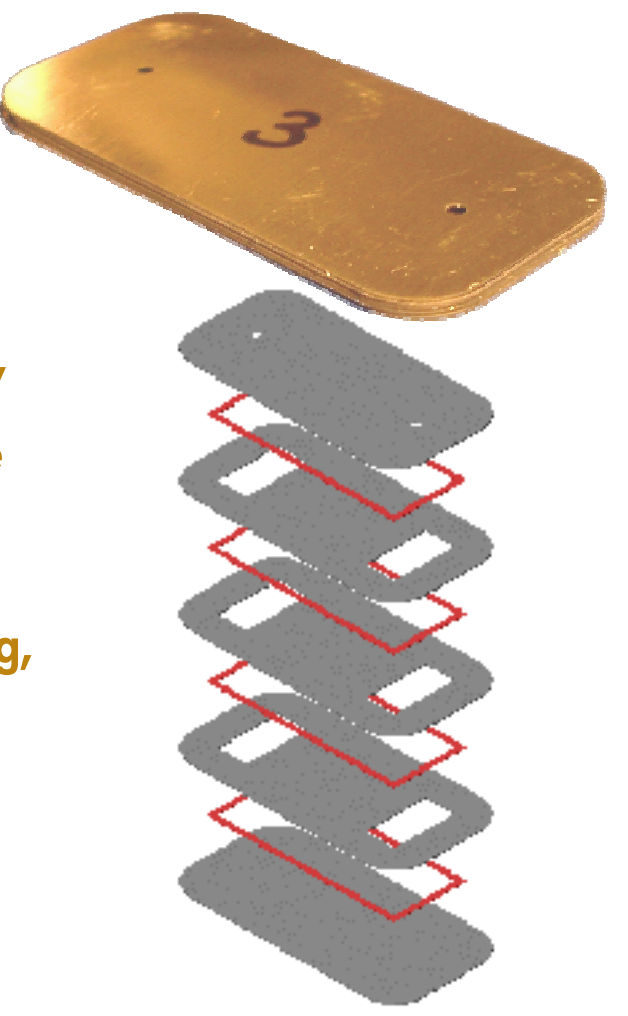
Micro-channels are produced by microlamination: patterning and bonding thin layers of polymer, metal & ceramic material to produce monolithic systems of embedded micro-channel arrays.

Patterning techniques used:

laser micromachining [excimer (deep UV) Nd:YAG (deep, UV, green, near infrared)], isotropic etching, punching, wire & plunge EDM, electrochemical etching, electro-forming, CNC machining, injection molding, hot embossing.

Bonding techniques used:

diffusion bonding, diffusion brazing, diffusion soldering, SMT soldering, thermal adhesive, pressure-sensitive adhesive, solvent welding, ultrasonic welding.



A copper microchannel array produced by solder paste bonding using surface mount technology. Channel height is 250 μm.

Round exit nozzles in 316L stainless steel produced by registering and bonding two photochemically etched substrates with hemispherical profiles. This device illustrates excellent (< 5 μm) layer-to-layer registration.