



Sino-Russian Symposium on Materials Science and Processing Technology



Laser welding of dissimilar materials, methods and techniques. Review of trends.

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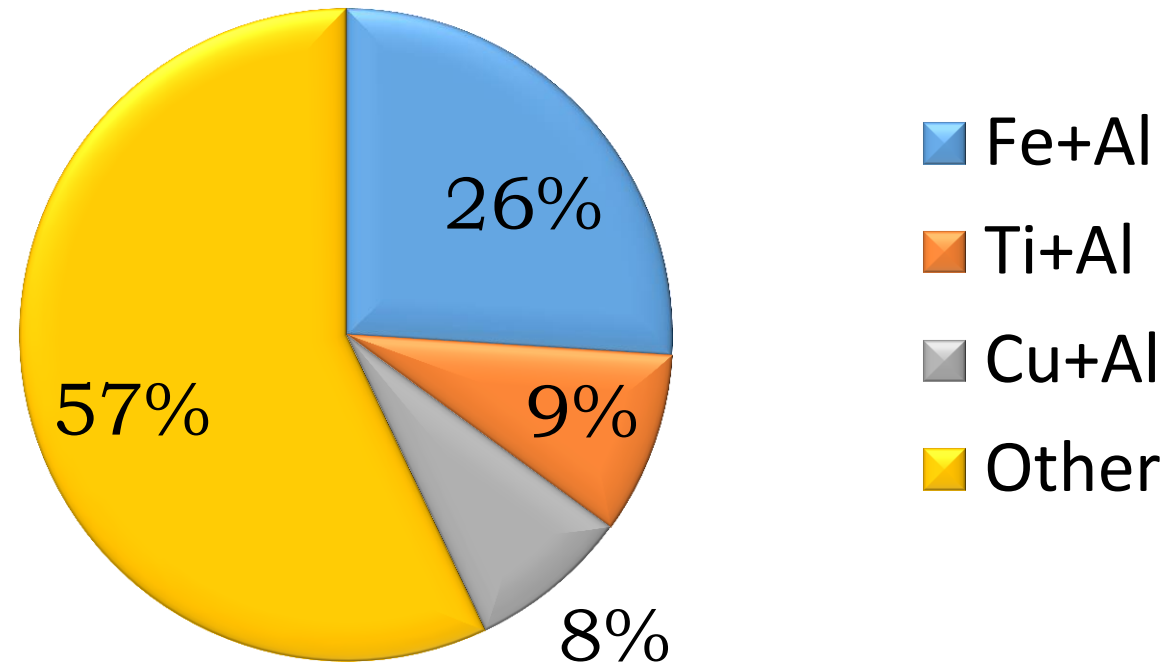
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Number of publications for the period 2016 - 2020

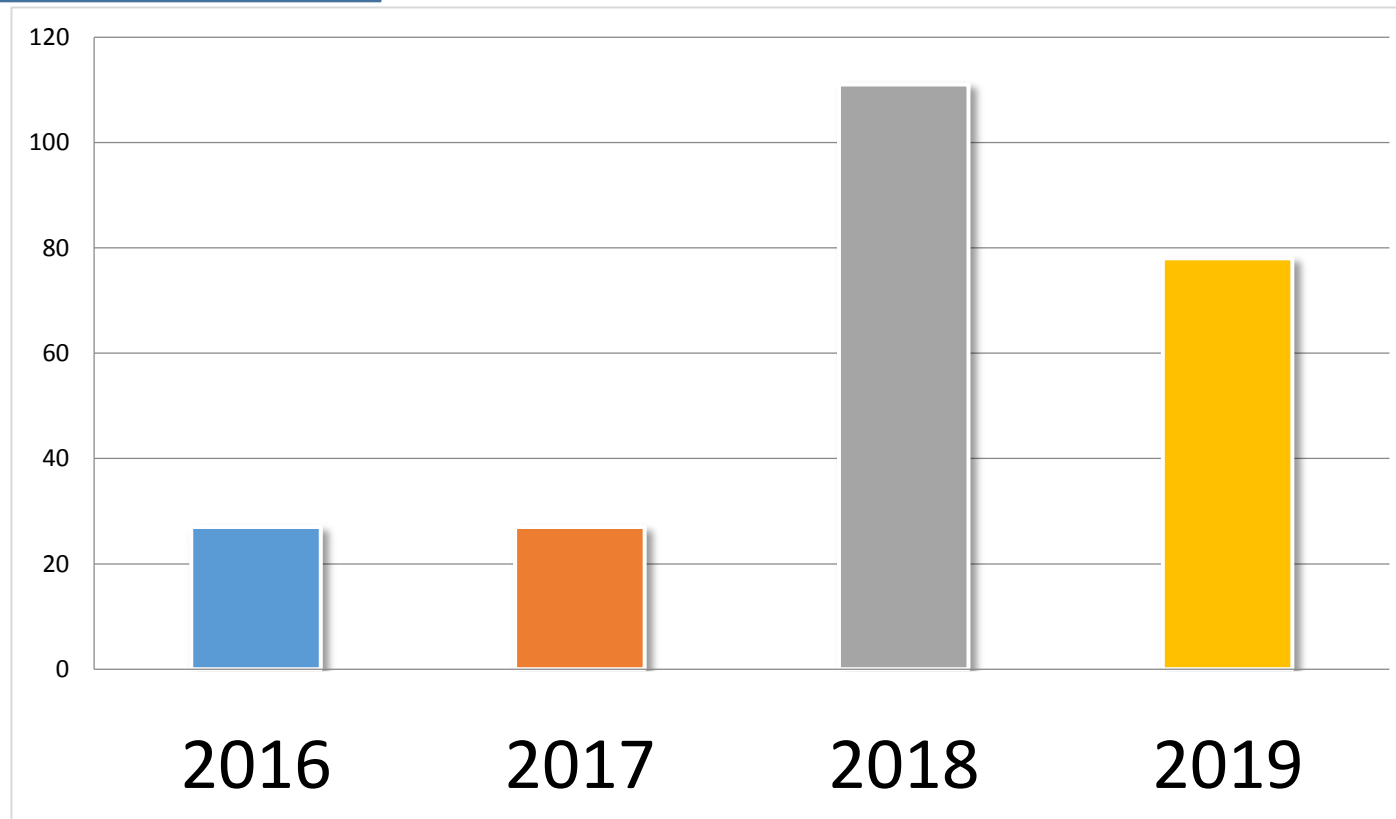




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Distribution of publications by year





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Metal	Density (kg/m ³)	Surface tension (N/m)	Crystal lattice type / lattice constant, nm	Atomic radius, pm	Electronegativity (Pauling scale)
Al	2700	0.914	FCC / 0.4	143	1.61
Fe	7870	1.872	FCC, BCC / 0.28	126	1.83
Ti	4500	1.650	HCP, BCC / 0.29	147	1.54
Cu	8930	1.770	FCC / 0.36	128	1.90

Metal	Melting point, °C	Coefficient of thermal conductivity, at 20 °C, W/(m×K)	Specific heat capacity (J/kg K)	Thermal expansion coefficient (10 ⁶ K)
Al	660	238	917	23.5
Fe	1539	78	456	12.1
Ti	1668	22	528	8.9
Cu	1083	397	386	17.0



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The main types of joints in laser welding of dissimilar metals

Lap



Edge fillet



Double-flanged edge



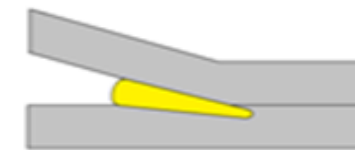
Stake



T-joint



Edge joint

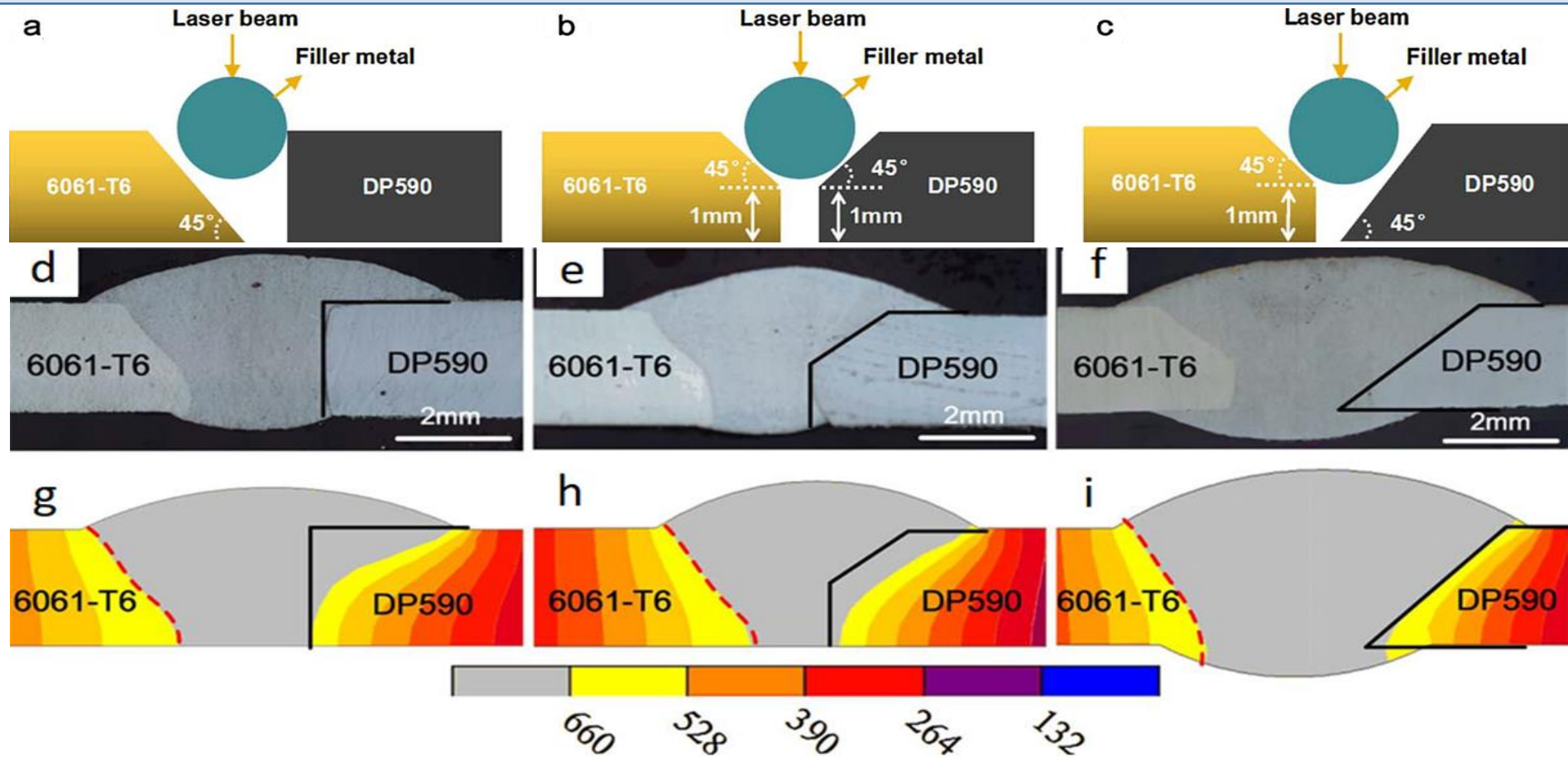




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Influence of edge preparation on the distribution of thermal fields

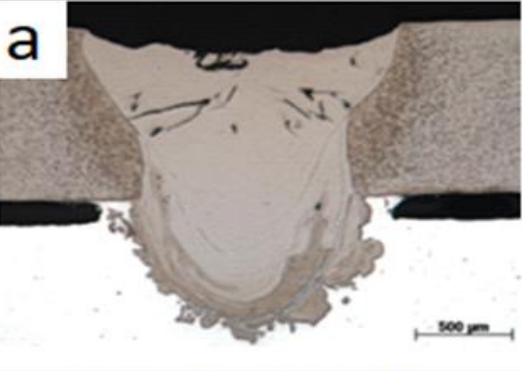
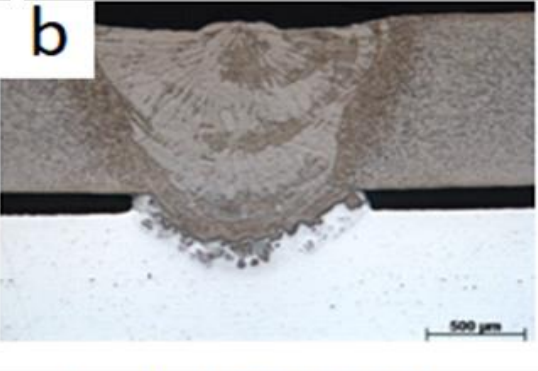
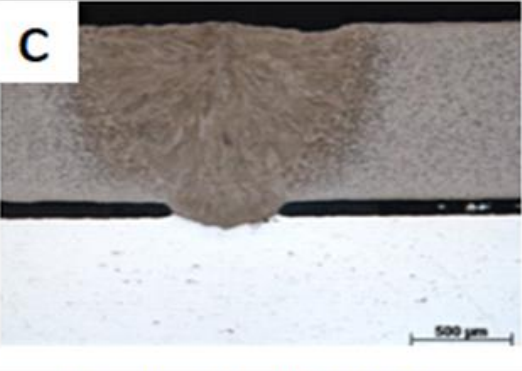







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Influence of heat input and metal on the shape of a welded joint

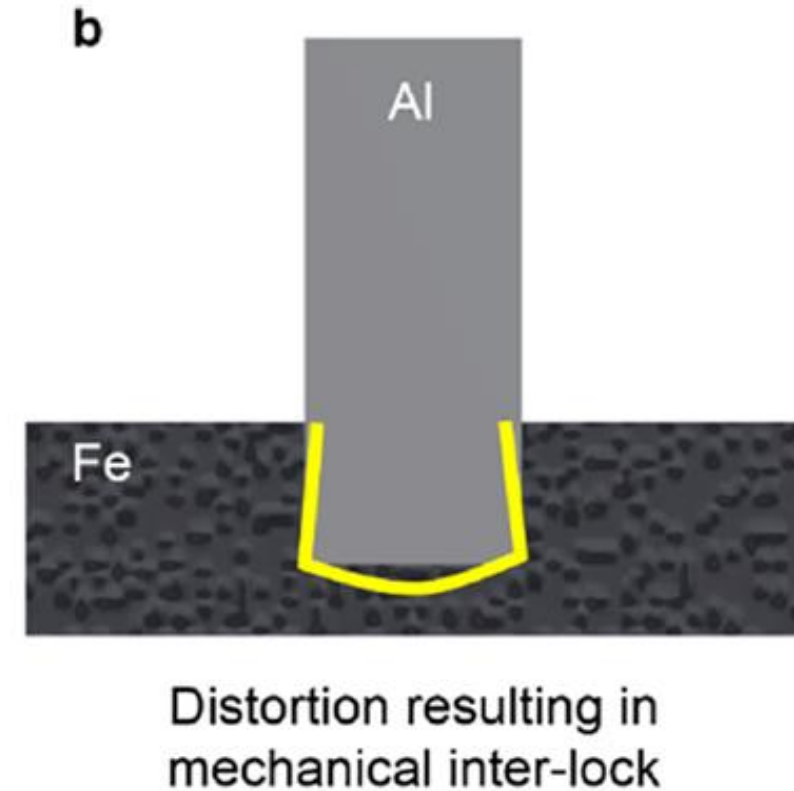
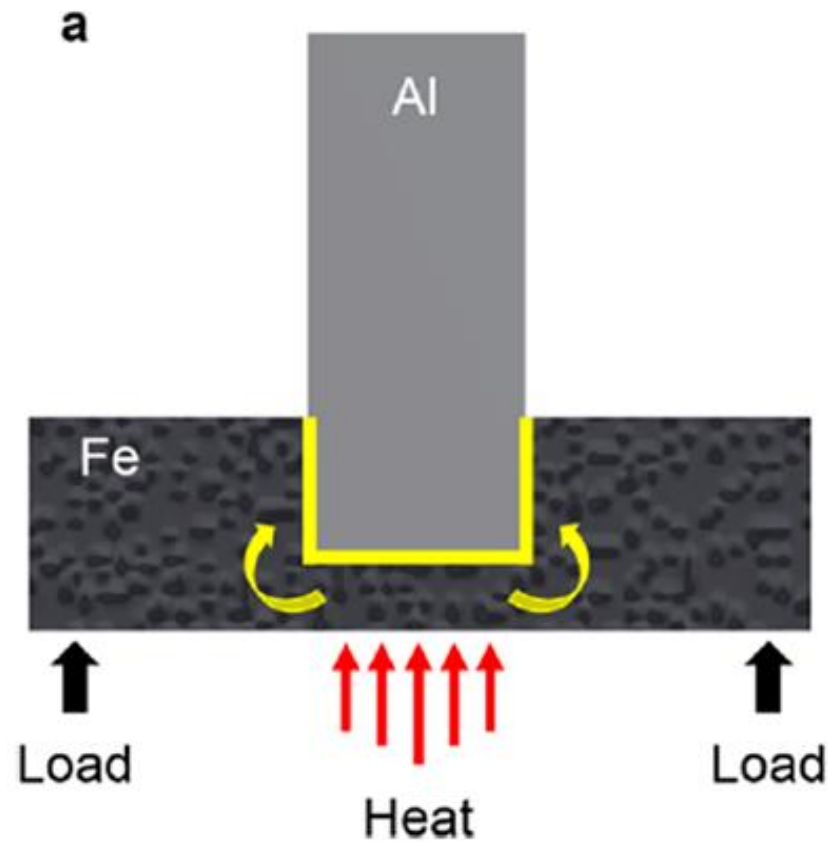
		
Steel – AA 45.00 kJ/m	Steel – AA 43.27 kJ/m	Steel – AA 41.67 kJ/m
		
AA – Steel 48.91 kJ/m	AA – Steel 46.88 kJ/m	AA – Steel 45.00 kJ/m



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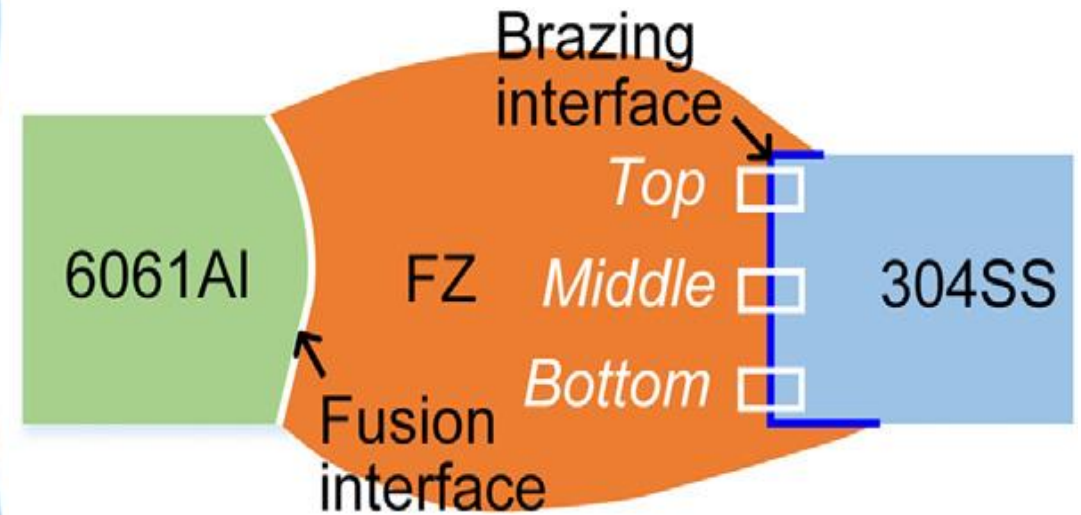
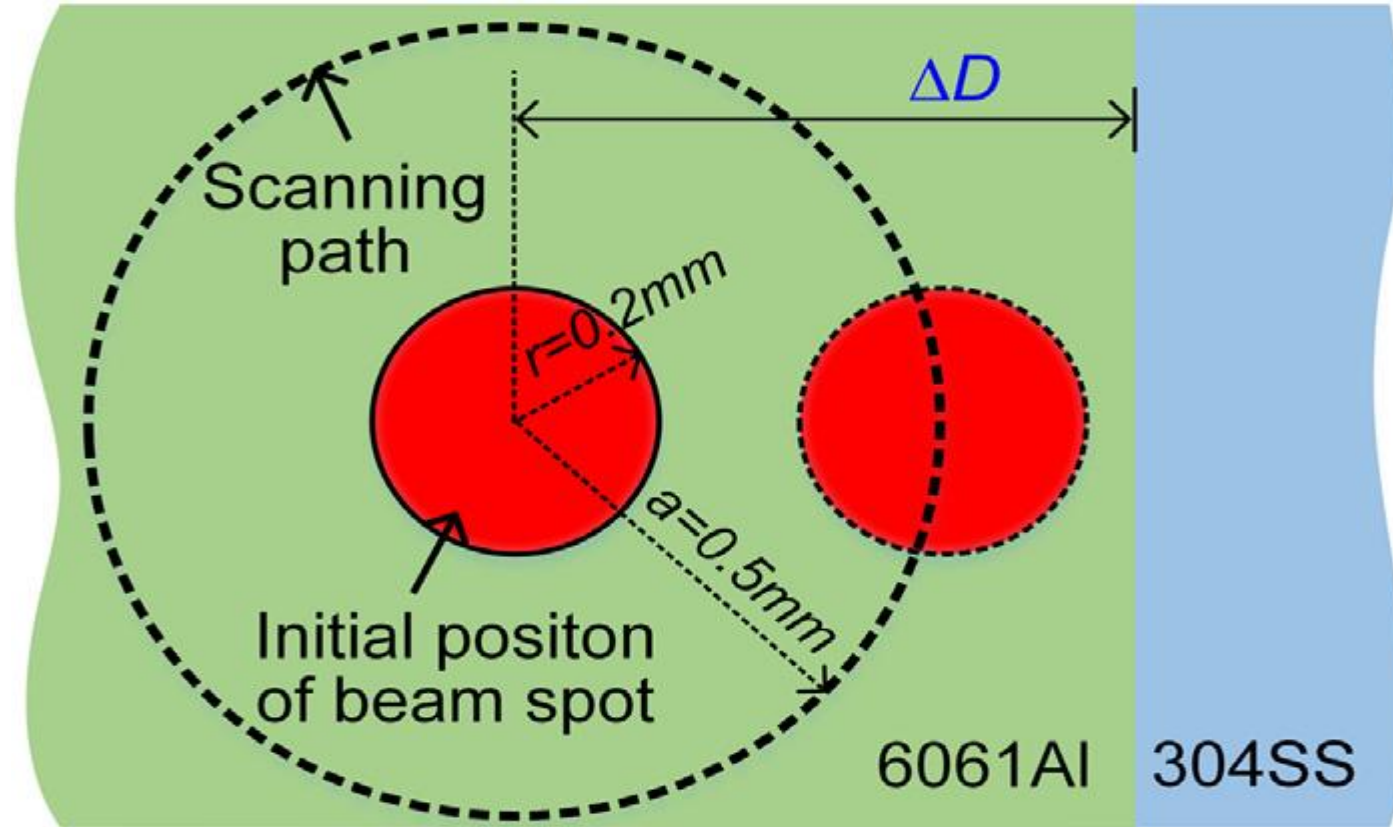


Laser Heated Hybrid Option





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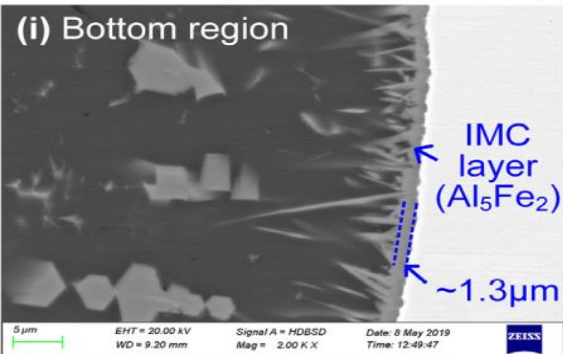
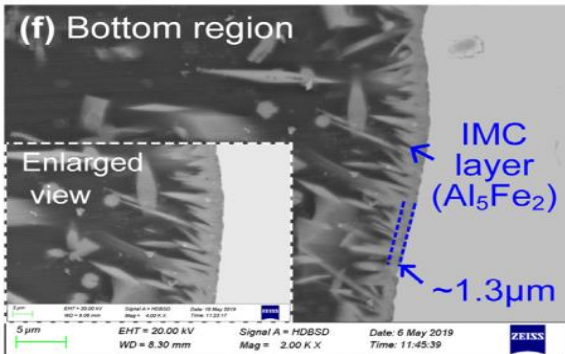
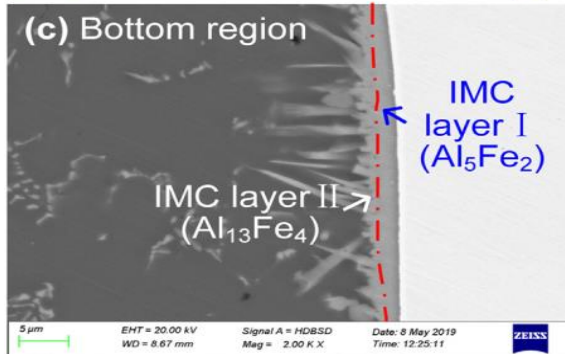
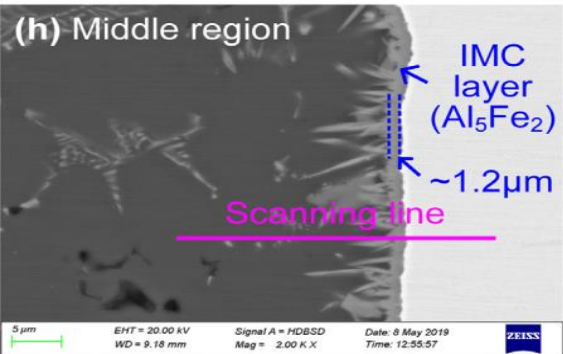
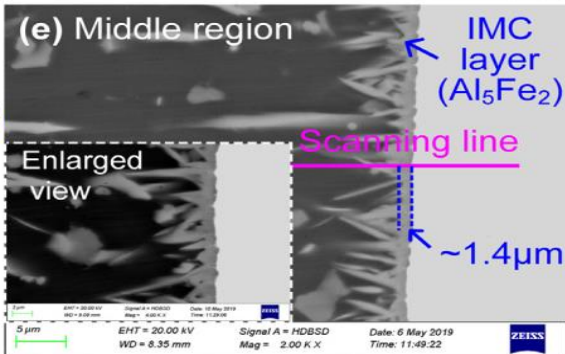
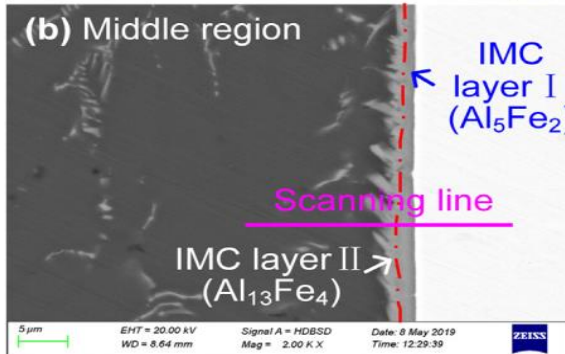
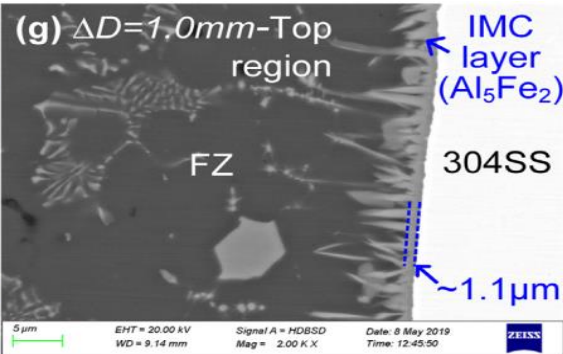
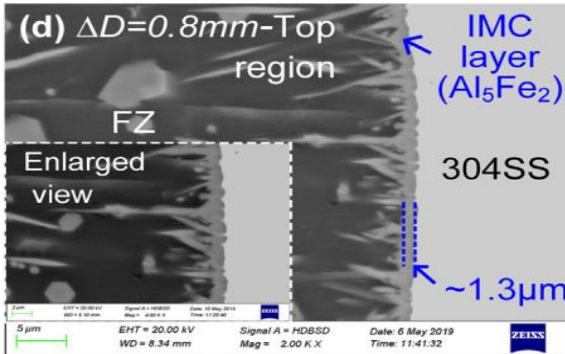
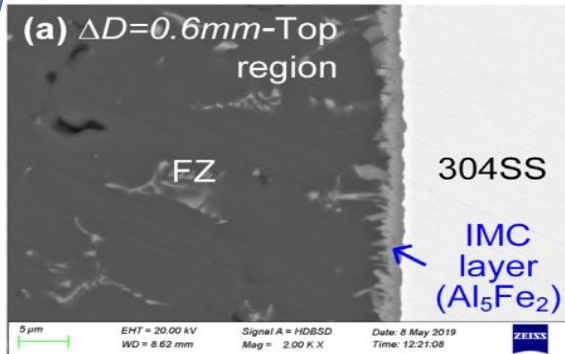




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Microstructure of the seam depending on the offset distance of the laser beam

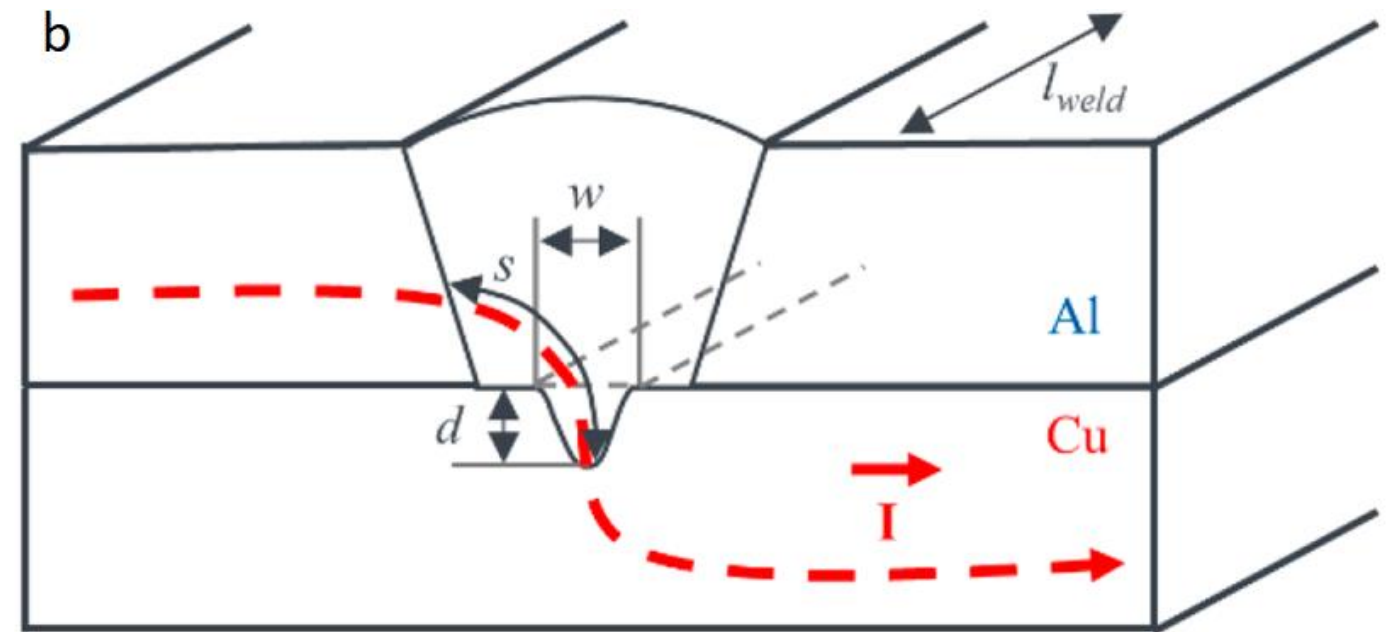
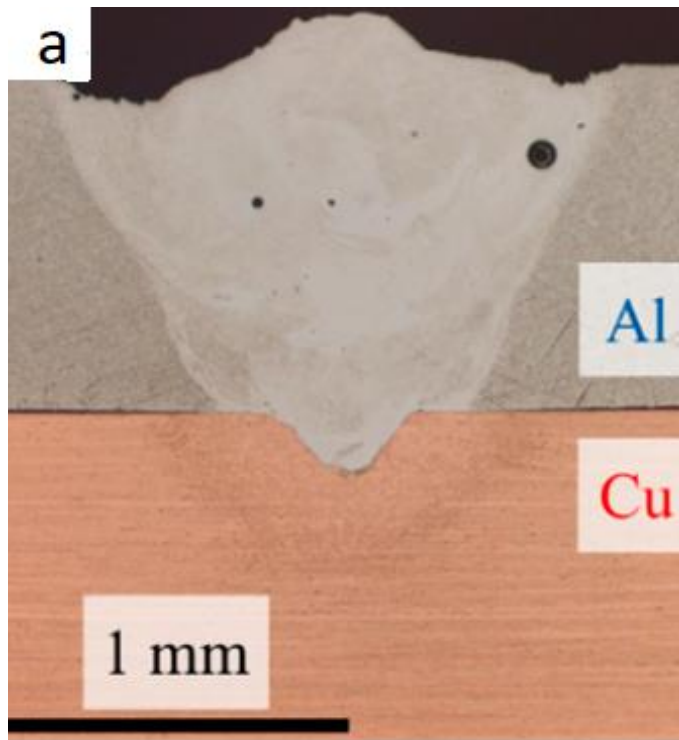




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Application of transverse vibrations of a laser beam to increase the contact area between copper and aluminum





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Methods and techniques to increase the weldability of dissimilar metals:

- shift of the beam to one of the welded metals;
- application of oscillations of a laser beam to change the shape and volume of the weld pool;
- study of the composition of the intermetallic layer using modern microscopic methods.



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Thanks for the used literary sources:

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Thank you!

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Etc.