

Study on the Solder Joint Reliability of New Diamond Chip Resistors for Power Devices

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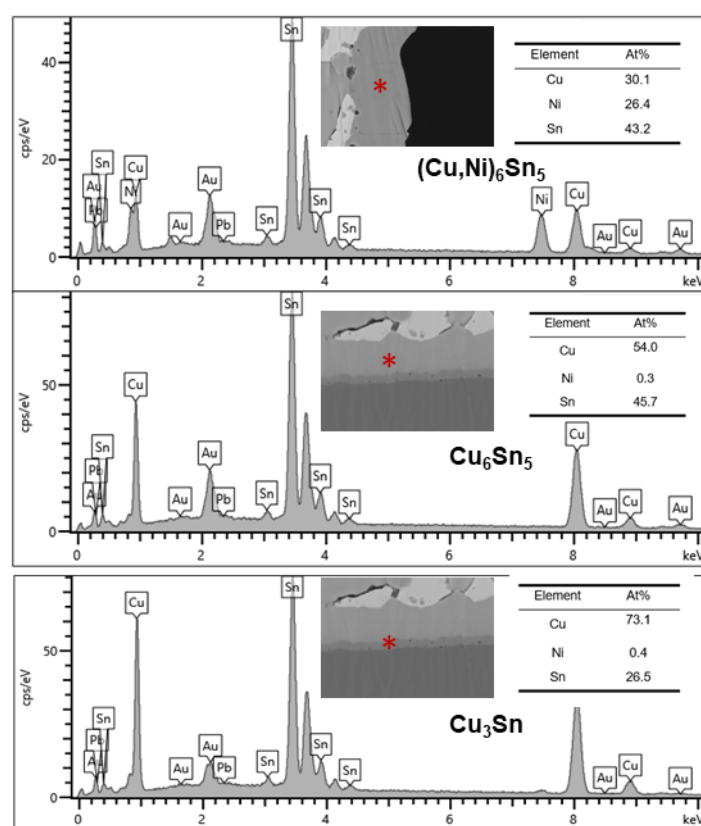
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Table S1. Material properties at 25 °C.

Position	Materials	Properties			
		Young's Modulus (GPa)	CTE (ppm·°C ⁻¹)	Poisson's Ratio	Density (Kg·m ⁻³)
Shell	5A06 Al alloy	270	24	0.33	2.63
Substrate of resistor	Diamond	1200	2	0.20	3.51
Solder	SnPb	30.55	25.4	0.35	8.46
Pad	Copper	128.93	17.6	0.34	8.94
Microstrip plate	Organic	16.9	14	0.11	1.98
	silicon and fluorinated	(X&Y)	(X&Y)	(XY)	
	material	7.4	35	0.39	
		(Z)	(Z)	(YZ&XZ)	

Table S2. Anand's constants of SnPb solder.

Ansys	Parameter	Value	Definition
A1	S_0 (Mpa)	12.4	Initial value of deformation resistance
A2	Q/R (K)	9400	Activation energy
A3	A (sec^{-1})	4×10^6	Pre-exponential factor
A4	ε	1.5	Multiplier of stress
A5	m	0.303	Strain rate sensitivity of stress
A6	H_0 (MPa)	1379	Harden constant
A7	\hat{s} (MPa)	13.8	Coefficient for deformation resistance saturation value
A8	n	0.07	Deformation resistance value
A9	a	1.3	Strain rate sensitivity of hardening

**Figure S1.** EDS results of IMCs.