TMS

Recommended Readings: Lead-Free Solders Physical Metallurgy and Alloy Development

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The following are recommended readings regarding alloy development and metallurgy of lead-free solders from an advisory group of TMS subject matter experts

TECHNICAL AREA	PAPER TITLE	AUTHOR(S)	SOURCE	
Alloy Development	*Metallurgy of Low Temperature Pb-Free Solder for Electronic Assembly*	J. Glazer	International Materials Reviews, vol. 40, no. 2, 1995, pp. 65- 93.	[view abstract]
	Microstructure and Mechanical Properties of Pb-Free Solder Alloys for Low-Cost Electronic Assembly: A Review	J. Glazer	J. Electr. Mater., vol. 23, no. 8, 1994, pp. 693-700.	
	Microstructure and Mechanical Behavior of Novel Rare Earth-Containing Pb-free Solders	M.A. Dudek, R.S. Sidhu, N. Chawla, and M. Renavikar	J. Elec. Mater., vol. 35, 2006, pp. 2088 - 2097.	[view abstract]
	Experimental and Thermodynamic Assessment of Sn-Ag-Cu Solder Alloys	K.-W. Moon, W.J. Boettinger, U.R. Kattner, F.S. Biancaniello, and C.A. Handwerker	J. Elect. Mater., vol. 29, 2000, p. 1122.	[view abstract]
	Microstructure and Mechanical Properties of Lead-free Solder Joints Used in Microelectronic Applications	S.K. Kang, P.A. Lauro, D.-Y. Shih, D.W. Henderson and K.J. Puttlitz	IBM J. Res. & Dev. , vol. 49 (4/5), 2005, p. 607-620.	[view paper]
	Physics and Materials for Lead-free Solders	K.N. Tu, A.M. Gusak, and M. Li	J. Appl. Phys., vol. 93 (3), 2003, pp. 1335-1353.	[view abstract]
	Development of Sn-Ag-Cu and Sn-Ag-Cu-X alloys for Pb-free electronic solder applications	I.E. Anderson	J. Mater. Sci: Mater. Electron, vol. 18:55-76, 2007, pp. 55-76.	[view paper]
Intermetallic Formation	*Influence of Initial Morphology and Thickness on Growth and Evolution of Cu6Sn5 and Cu3Sn Intermetallics During Thermal Aging of Sn-Ag Solder/Cu Joints*	X. Deng, G. Piotrowski, J.J. Williams, and N. Chawla	J. Elect. Mater., vol. 32, 2003, pp. 1403-1413.	[view abstract]
	Intermetallic Growth Behavior of Low and High Melting Temperature Solder Alloys	D. R. Frear and P. T. Vianco	Metall. Trans., vol. 25A, 1994, pp. 1509-1523.	[view abstract]
Tin Whisker Formation	*Mechanism and prevention of spontaneous tin whisker growth*	K. N. Tu, J. O. Suh, A. T. C. Wu, N. Tamura, and C. H. Tung	Mater. Trans., vol. 46 (11), 2005, pp. 2300-2308.	[view abstract]
	Whisker and Hillock Formation on Sn, Sn-Cu and Sn-Pb Electrodeposits	W.J. Boettinger, C.E. Johnson, L.A. Bendersky, K.-W. Moon, M.E. Williams, and G.R. Stafford	Acta Mater., Vol. 53, 2005, pp. 5033-5050.	[view abstract]
	Sn-Whiskers: Truths and Myths	J. Osenbach, J. M. DeLucca, B. D. Potteiger, A. Amin, and F. A. Baiocchi	Journal of Materials Science: Materials in Electronics, vol. 18(1-3), 2007, pp. 283-305.	[view paper]
	A History of Tin Whisker Theory: 1946-2004	G. T. Clayton	SMTAI International Conference, September 26-30, 2004	[view paper]
Dissolution of Metals	*Cu Substrate Dissolution in Eutectic Sn-Ag Solder and Its Effect on Microstructure*	S. Chada, R. A. Fournelle, W. Laub and D. Shangguan	J. Elect. Mater.., vol. 29, no. 10, 2000, pp. 1214-1221.	[view abstract]
Electromigration	*Electromigration in Pb-free SnAg3.8Cu0.7 solder stripes*	Y. C. Hsu, C. K. Chou, P. C. Liu, Chih Chen, D. J. Yao, T. Chou, and K. N. Tu,	J, Appl Phys. Vol. 98 (3): Art. No. 033523, 2005	[view abstract]