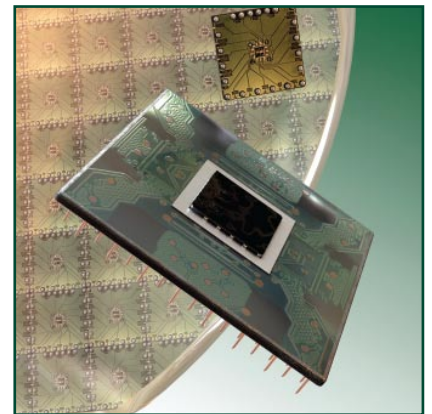
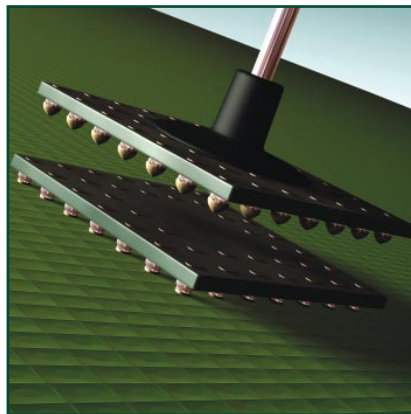
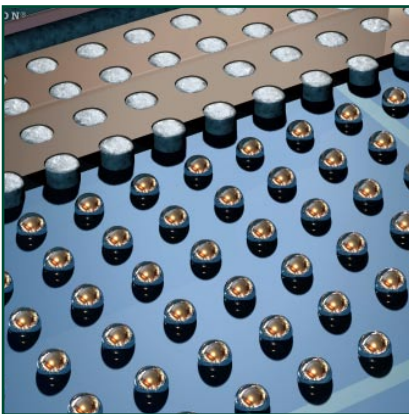
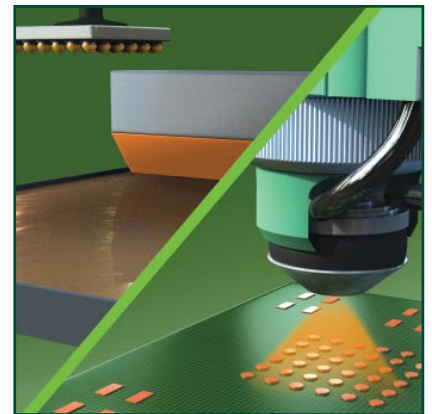
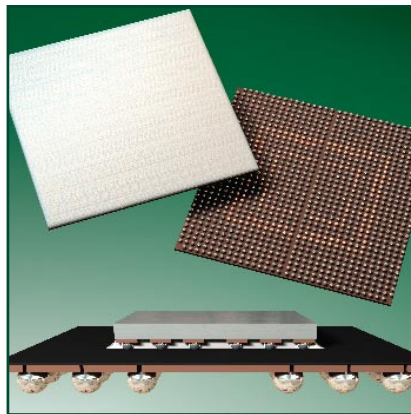
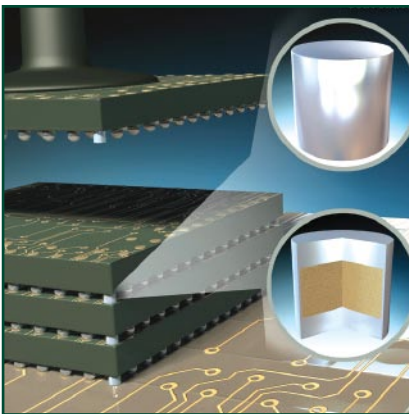
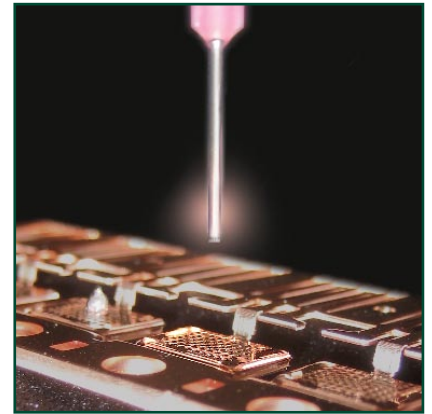
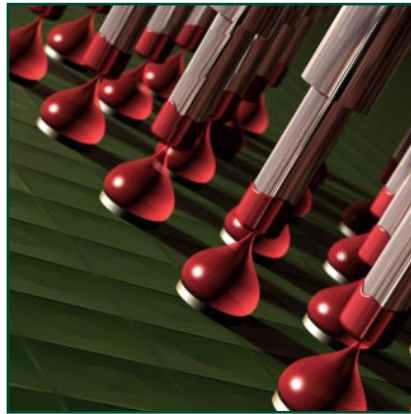
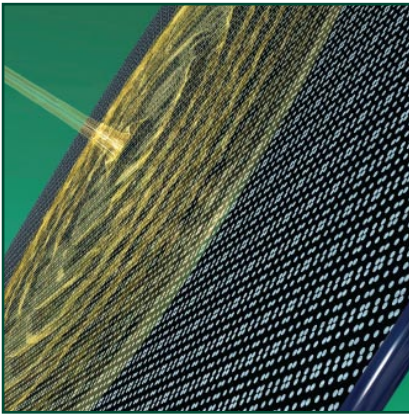


Semiconductor and Advanced Assembly Materials

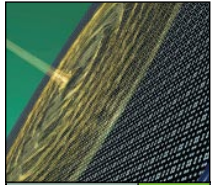


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Semiconductor and Advanced Assembly Materials

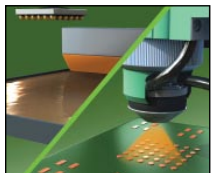
Wafer Bumping Fluxes:



Indium Corporation's Semiconductor-Grade Wafer Bumping Fluxes are applied by jetting or dispense, followed by spin-coating to optimize film thicknesses. Reflowed in very low (<10ppm) oxygen/nitrogen atmosphere, these fluxes convert rough, non-spherical plated or wafer probe-dented solder bumps into shiny spheres. Proven applications include both copper pillar microbumps and standard bumps from plated, reflowed solder paste or ball drop processes.

Flux Type	Flux Type	Flux Application Method	Description	Target Application	Cleaning Method	Halogen-free?	Material	Roadmap or released product?
Wafer Bumping Flux	SC	Spin coating	Liquid flux for reflow of solder bumps on UBM	High Pb; Eutectic (63Sn/37Pb); SnAg	Solvent or aqueous-based chemistry	YES: NIA	Wafer Flux SC-5R	Released Q3, 2011
Wafer Bumping Flux	WS	Spin coating	Liquid flux for reflow of solder bumps on UBM	SnAg solder bumps	Cleanable with warm DI water only (no chemistry)	YES: NIA	Wafer Flux WS3401, WS3543	Released Q2, 2009
Copper Pillar Wafer Bumping Flux	WS	Spin coating	Liquid flux for reflow of solder micro bumps on top of copper pillars	40micron pitch copper pillars (micro bumps)	Cleanable with warm DI water only (no chemistry)	YES: NIA	Wafer Flux WS3401, or combination of WS3401 and WS3401A	Released Q1, 2011

Flip-Chip Fluxes:



Indium Corporation's Semiconductor-Grade Flip-Chip Fluxes are applied by dipping or spraying and reflowed in low-oxygen atmospheres – typically less than 25ppm oxygen/nitrogen. They are designed for use in different applications, from 40micron pitch copper pillar 2.5D and 3D chip-stack applications to standard solder bump/solder-on-pad (SOP) or solder bump/substrate-metallization applications.

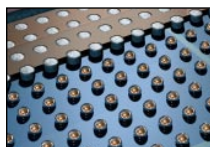
STANDARD FLIP-CHIP FLUXES

Flux Type	Flux Type	Flux Application Method	Description	Target Application	Cleaning Method	Halogen-free?	Material	Roadmap or released product?
Flip-Chip Flux	NC-NZR	Spraying	Flux sprayed onto substrate for flip-chip attach	180micron pitch SnAg onto SOP	No-clean	YES: NIA	Flip-Chip Flux FC-NC-HT-A1	Released Q3, 2009
Flip-Chip Flux	WS	Spraying	Flux sprayed onto substrate for flip-chip attach	165micron pitch SnAg onto SOP for multicore logic flip-chip die	Cleanable with warm DI water only (no chemistry)	YES: NIA	Flip-Chip Flux WS575-SP	Released Q2, 2011
Flip-Chip Flux	WS	Dipping	Flux applied to the solder bumps on a flip-chip by dipping	Eliminates voiding from probe-test indents in flip-chip bumps	Cleanable with aqueous surface-tension lowering chemistry	Halogenated	Flip-Chip Flux WS446	Released Q2, 2007
Flip-Chip Flux	WS	Dipping	Flux applied to the solder bumps on a flip-chip by dipping	Eliminates voiding from probe-test indents in flip-chip bumps	Cleanable with aqueous surface-tension lowering chemistry	YES: NIA	Flip-Chip Flux WS688	To be released Q1, 2012
Flip-Chip Flux	NC-ULR	Dipping	Flux applied to the solder bumps on a flip-chip by dipping	General purpose flux: compatible with underfill/overmolding compounds	No-clean	YES: NIA	Flip-Chip Flux NC510	Released Q2, 2009
Flip-Chip Flux	NC-ULR	Dipping	Flux applied to the solder bumps on a flip-chip by dipping	Improved wetting onto copper/OSP: compatible with underfill/overmolding compounds	No-clean	YES: NIA	Flip-Chip Flux 26A	To be released Q1, 2012

COPPER PILLAR (MICRO BUMP) FLIP-CHIP FLUXES:

Flux Type	Flux Type	Flux Application Method	Description	Target Application	Cleaning Method	Halogen-free?	Material	Roadmap or released product?
Copper Pillar Flip-Chip Flux	WS	Dipping	Flux for flip-chip attach of micro bumps+ onto interposers	40micron pitch copper pillars attached to substrate using thermocompression bonding	Cleanable with aqueous surface-tension lowering chemistry	YES: NIA	Copper Pillar Flip-Chip Flux WS641	Released Q2, 2011
Copper Pillar Flip-Chip Flux	NC-NZR	Dipping	Dippable liquid flux for flip-chip attach of microbumps onto interposers	40micron pitch copper pillars attached to substrate using thermocompression bonding	No-clean flux compatible with thermocompression bonding	YES: NIA	Developmental flux 699-34-1	Roadmap: Q2, 2012
Copper Pillar Flip-Chip Flux	NC-NZR	Spraying	Sprayable liquid flux for flip-chip attach of microbumps onto interposers	40micron pitch copper pillars	No-clean flux compatible with thermocompression bonding	YES: NIA	Experimental product	Roadmap: Q3, 2012

Wafer Level Chip Scale Package (WLCSP) Fluxes:



Indium Corporation's Semiconductor-Grade Wafer-Level Chip Scale Package Fluxes are applied by screen or stencil printing. They are usually reflowed in atmospheres at less than 100ppm oxygen/nitrogen.

Flux Type	Flux Type	Flux Application Method	Description	Target Application	Cleaning Method	Halogen-free?	Material	Roadmap or released product?
Wafer-Level CSP Ball-Mount Flux	WS	Printing	Water-soluble flux for printing onto wafers before balldrop	0.5, 0.4, 0.3mm pitch WL-CSP	Cleanable with warm DI water only (no chemistry)	YES: NIA	Ball-Attach Flux WS575-A	Released Q3, 2011
Wafer-Level CSP Ball-Mount Flux	NC-ULR	Printing	Ultra-low residue flux for printing onto wafers before balldrop	0.1mm pitch and smaller applications	No-clean	YES: NIA	Flip-Chip Flux 26A	Released Q4, 2011
Wafer-Level CSP Ball-Mount Flux	EP	Printing	Epoxy flux for printing onto wafers before balldrop for WL-CSP	0.5, 0.4, 0.3mm pitch WL-CSP. Cured epoxy compatible with underfill	No-clean	YES: NIA	Developmental flux 669-56A	Roadmap: Q3, 2012

Epoxy Fluxes:



Non-filled epoxy fluxes are applied by jetting or dipping processes for WLCSP attach to substrates over prolonged timeframes. They allow "one process" reflow in tandem with solder paste without subsequent underfill and curing. Epoxy fluxes are designed for air-reflow, but may benefit from the use of nitrogen.

Flux Type	Flux Type	Flux Application Method	Description	Target Application	Cleaning Method	Halogen-free?	Material	Roadmap or released product?
WL-CSP Attach Flux	EP	Jetting or dipping	Jettable flux for 0.4-0.8mm pitch WL-CSP	Replaces solder paste and underfill for SMT attach of WL-CSPs	No-clean	YES: NIA	Developmental product 650-48	Roadmap: Q2, 2012
WL-CSP Attach Flux	EP	Jetting or dipping	Jettable colored flux (blue) for 0.4-0.8mm pitch WL-CSP	Replaces solder paste and underfill for SMT attach of WL-CSPs	No-clean	YES: NIA	Developmental product 669-64A	Roadmap: Q3, 2012
WL-CSP Attach Flux	EP	Jetting	Jettable colored flux for 0.3mm pitch WL-CSP	Replaces solder paste and underfill for SMT attach of WL-CSPs	No-clean	YES: NIA	Experimental product	Roadmap: Q4, 2012

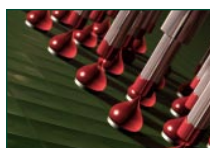
Package-on-Package (PoP) Fluxes:



No-clean PoP fluxes are applied by dipping, and can be used in both two-stage and one-stage reflow processes. They are almost always reflowed in air.

Flux Type	Flux Type	Flux Application Method	Description	Target Application	Cleaning Method	Halogen-free?	Material	Roadmap or released product?
PoP Flux	NC	Dipping	Dipping (PoP) flux for down to 0.3mm pitch	Flux for top (memory) packages in flanged or TMV-type. Pb-free alloys only	No-clean	Halogenated	PoP Flux 89-LV	Released Q4, 2009
PoP Flux	NC	Dipping	Dipping (PoP) flux for down to 0.3mm pitch	Flux for top (memory) packages in flanged or TMV-type	No-clean	YES: NIA	PoP Flux 89-HF-LV	Released Q4, 2009
PoP Flux	NC	Dipping	Dipping (PoP) flux for down to 0.3mm pitch	High SIR flux for high reliability PoP packages	No-clean	YES: NIA	Experimental product	Roadmap: Q3, 2012

Ball-Attach Fluxes:



Indium Corporation's Semiconductor-Grade Ball-Attach Fluxes are applied by pin-transfer or printing. They are usually reflowed in air, but are also suitable for use in reduced oxygen atmospheres – typically less than 100ppm oxygen/nitrogen.

Flux Type	Flux Type	Flux Application Method	Description	Target Application	Cleaning Method	Halogen-free?	Material	Roadmap or released product?
Ball-Attach Flux	WS	Pin-transfer	Pin-transfer flux for down to 0.5mm pitch BGA	General purpose	Cleanable with warm DI water only (no chemistry)	Halogenated	Ball-Attach Flux WS446-AL	Released Q3, 2008
Ball-Attach Flux	WS	Pin-transfer	Pin-transfer flux for down to 0.5mm pitch BGA	General purpose: non-staining on low-cost BGA substrate soldermask	Cleanable with warm DI water only (no chemistry)	YES: Halogen compliant	Ball-Attach Flux WS676	To be released Q1, 2012
Ball-Attach Flux	NC	Pin-transfer	Pin-transfer flux for down to 0.5mm pitch BGA. Wets onto bare nickel	Cost down BGA (no Ag or Au plating needed on CuNi substrate pads)	No-clean	Halogenated	Ball-Attach Flux NC506	Released Q1, 2007
Ball-Attach Flux	NC	Pin-transfer	Pin-transfer flux for down to 0.5mm pitch BGA. Wets onto bare nickel	Cost down BGA (no Ag or Au plating needed on CuNi substrate pads)	No-clean	YES: Halogen compliant	Ball-Attach Flux NC585	Released Q4, 2008