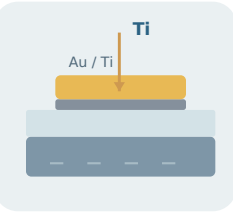
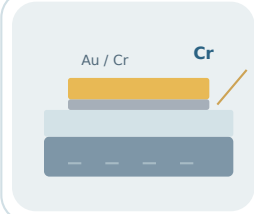
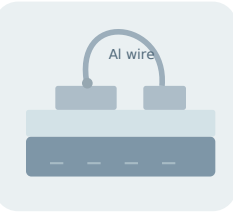
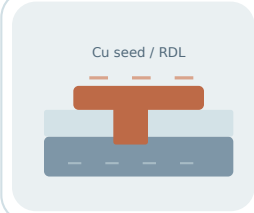
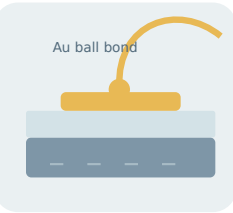
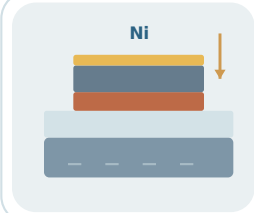
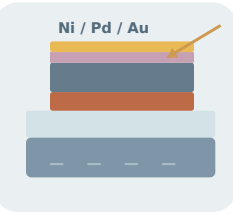
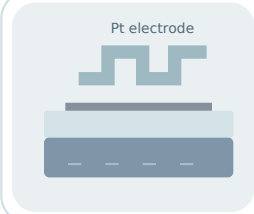
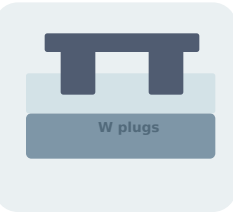
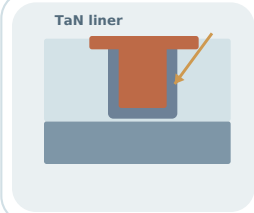


Thin-Film & Metallization Materials

Adhesion layers | conductors | bondable finishes | diffusion barriers | semiconductor packaging

	Titanium Adhesion under Au, Pt and other noble-metal films. Reactive metal avoid air break before capping	Ti adhesion
	Chromium Alternative adhesion layer on glass and oxide. Oxidizes control stress and Au interface	Cr adhesion
	Aluminum / AlCu On-chip wiring, electrodes and ultrasonic bond pads. Native oxide Al wedge-bond compatibility	Al conductor
	Copper Low-resistance RDL, via fill and plating seed. Fast diffuser needs qualified barrier/cap	Cu conductor
	Gold Bond pads, noble-metal contacts and corrosion caps. Soft, costly verify cleanliness & bondability	Au bond surface
	Nickel Underplate for solderable and bondable finishes. Acts as barrier cap to limit oxidation	Ni UBM / barrier
	Palladium Ni diffusion control in Ni/Pd/Au finishes. Protects Au interface finishing dependent	Pd cap / barrier
	Platinum Stable electrodes and high-temperature contact layers. Noble metal often needs adhesion underlayer	Pt electrode
	Tungsten CVD contact plugs, vias and refractory electrodes. High melting point film stress/chemistry	W contact fill
	Diffusion barriers Cu liners, interface barriers and seed underlayers. Qualify thickness, continuity and annealing	Ta/TaN · TiW/TiN

EXAMPLE STACKS: Simple bond pad: Ti/Au or Cr/Au | Higher-T electrode: Ti/Pt/Au | Cu: Ta(N)/Cu | Finish: Ni/Pd/Au

Schematic illustrations, not to scale. Layer ordering, film thickness, deposition and surface preparation must be process-qualified.
Sources: IBM Cu interconnects & barrier studies; Fraunhofer ISIT ENEPIG; Kyocera Ni-Pd-Au; microelectronics metallurgy literature.