

Xenolyte® Au

Electroless gold plating



Electronics

Semiconductor

atotech.com

Electroless Au solutions for EN(EP)IG and EN(EP)AG applications for pad and RDL housing

Xenolyte® Au in EN(EP)IG and EN(EP)AG applications

MKS' Atotech offers a variety of Xenolyte® Au processes which are commonly used for gold plating in electroless Ni/electroless Pd/immersion Au (ENEPIG), electroless Ni/immersion Au (ENIG) or electroless Ni/electroless Pd/autocatalytic Au (ENEPAG), electroless Ni/autocatalytic Au (ENAG) deposits and are part of our Xenolyte® portfolio. This includes processes and products for cleaning and activation pre-treatment solutions, as well as plating chemistries for the electroless deposition of nickel, palladium, and gold on Cu and Al.

The main applications can be found in pad metallization and RDL shielding, where our Xenolyte® product suite enables hard, corrosion-free, and stress-minimized metal stacks to protect underlying active structures. They provide a robust, stable, and low-resistance solder joint connection to the IC substrate.

The role of Au in EN(EP)IG and EN(EP)AG applications

For under bump metallization in semiconductor devices, EN(EP)IG/EN(EP)AG processes are employed as standard final finish prior to wire bonding and solder application. In the stack, Ni acts as a barrier layer, preventing Cu from interacting with the other metals involved, particularly gold. Additionally, Ni (as well as Pd) prevent the Cu surface to be affected by the tin in the solder material. These barriers improve solderability immensely. As Ni is susceptible towards oxidation, an additional protection layer of Pd and/or Au is applied to cover the entire Ni surface.

EN(EP)IG/EN(EP)AG is generally applied in power semiconductor applications.

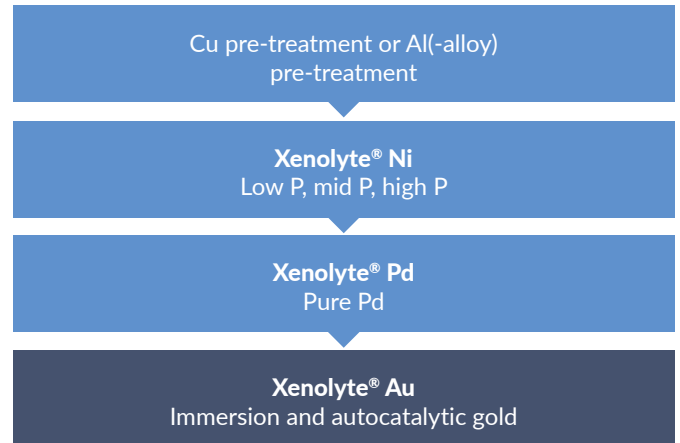
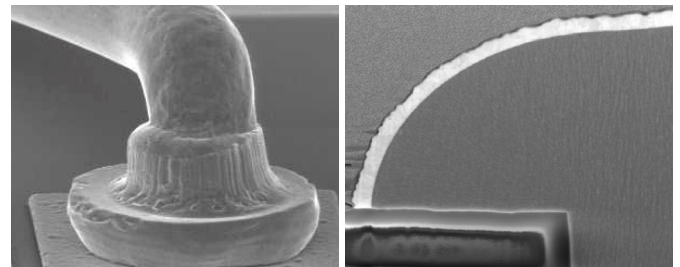


Figure 1:
Top: ENIG stack for Cu wire bonding and final finish on NiP
Bottom: Typical ENEPIG/ENEPAG process scheme

Electroless Au solutions for EN(EP)IG and EN(EP)AG applications for pad and RDL housing

Product	Characteristics	Application
Xenolyte® Au C	Stable immersion Au bath based on K[(AuCN2)]	
Xenolyte® Au CF 2	Improved sulfite-based cyanide-free immersion Au bath with reduced Ni corrosion	Under bump/ pad metallization for Cu wire bonding and soldering
Xenolyte® Au TG	Cyanide-, EDTA-, and formaldehyde-free thick gold (up to 250 nm) with long bath life	

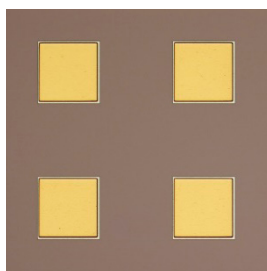


Figure 2:
ENEPIG pad on AlCu support

We offer a broad variety of Xenolyte® Au processes

Our Xenolyte® Au processes comprise a variety of cyanide-based and cyanide-free gold processes. As such Xenolyte® Au C is our stable immersion, cyanide-based gold bath for highly reliable Au deposition of up to 50 nm. Xenolyte® Au CF 2 is the corresponding cyanide-free process, which was additionally tailored towards lowest Ni corruptions.

Xenolyte® Au TG, our autocatalytic, cyanide-free process, was developed for the deposition of thick gold layers, and allows the corrosion free deposition of Au on Ni and Ni/Pd of up to 250 nm.

All our Xenolyte® Au processes are high-volume manufacturing proven and qualified for automotive applications as well as MEMS. They can be used in single wafer as well as wet bench tools and hence allow cost-efficient manufacturing. They are designed for state-of-the-art, as well as next-generation semiconductor applications in under bump/pad metallization for Cu wire bonding and soldering.

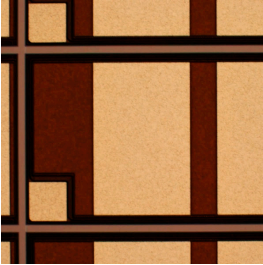


Figure 3:
Ni/Au stack for pad metallization. Thickness of Au is 50 nm.

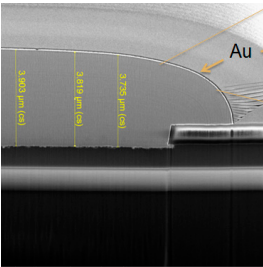


Figure 4:
30 nm Au layer on top of 3.9 µm Xenolyte® Ni (ENIG process) for pad metallization

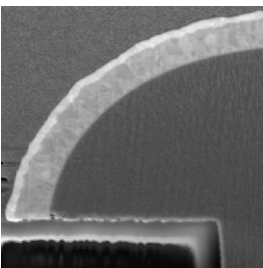


Figure 5:
120 nm Au layer on top of 400 nm Xenolyte® Pd and 3 µm Xenolyte® Ni (ENEPAG process) for pad metallization

Xenolyte® Au C – cyanide-based gold process

- Qualified for automotive applications and MEMS
- Perfect surface finish for highest reliability applications (5,000 h at 175 °C)
- Long lifetime
- High volume manufacturing proven
- Immersion Au process for up to 50 nm Au
- Deposition rate of 3-15 nm/min
- For wet benches and single wafer tools

Product overview

Xenolyte® Metal Additive SI	Xenolyte® Au Make Up C
Xenolyte® Au Replenisher C	Optional: Xenolyte® Au Starter C

Xenolyte® Au CF 2 – cyanide-free gold process

- High-volume manufacturing proven
- Cyanide-free, sulfite-based gold process
- Reduced Ni corrosion
- Immersion Au process for up to 60 nm Au
- Deposition rate of 2-10 nm/min
- For wet benches and single wafer tools

Product overview

Xenolyte® Au Solution CF 2	EXPT Xenolyte® Au Complexer CF 2
EXPT Xenolyte® Au Additive CF 2	EXPT Xenolyte® Au Stabilizer CF 2

Xenolyte® Au TG – cyanide-free gold bath for thick gold deposition

- Autocatalytic Au process for up to 250 nm Au
- Cyanide, EDTA and formaldehyde-free process
- No immersion Au pre-strike step required
- Corrosion free deposition on Ni and Ni/Pd
- Extended bath lifetime
- Deposition rate of 5-15 nm/min
- For wet benches and single wafer tools

Product overview

Xenolyte® Au Complexer TG	Xenolyte® Au Solution TG
Xenolyte® Au Stabilizer TG	Xenolyte® Au Reducer TG

End markets and industries we serve



Smartphone



Automotive electronics



Computing



Big data infrastructure



Consumer electronics



Communication infrastructure

