



**Honeywell RadLo™ Low Alpha
Packaging Materials**

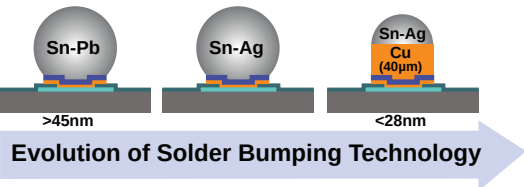
Honeywell RadLo™ Low Alpha Materials for Advanced Packaging Solutions

Enabling High-Performance Devices

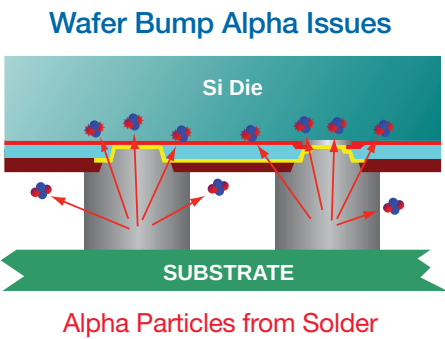
Alpha emissions from packaging materials can cause soft errors in vulnerable devices. Honeywell has developed a wide range of low alpha packaging materials to meet this challenge.



Impact of Alpha Emissions on Device Performance



Device miniaturization puts packaging materials, such as wafer bumps and Cu pillar solder caps, in proximity to critical device layers. Flip-chip devices and 3-D wafer-level chips are particularly vulnerable to alpha emissions from these packaging materials.



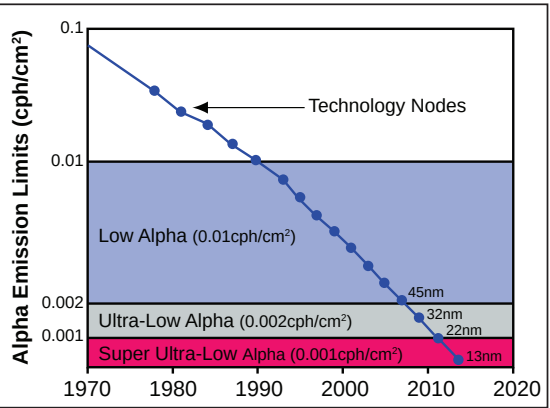
Industry Needs

To Reduce Soft Errors in Devices, Packaging Materials Must:

- Meet critical alpha emission specifications
- Exhibit stable alpha emission levels over time
- Be customizable and offer ease of integration

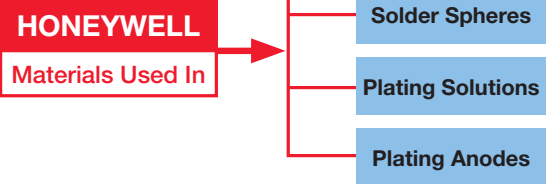
RadLo Materials:

- Reduction in alpha-emitting contaminants enables materials to meet emission specifications
- Metrology processes help ensure that alpha emissions from materials do not increase over time
- Available in various form factors and alloys



Device Miniaturization Drives Need for Lower Alpha Emissions

Honeywell's Role in Low Alpha Materials Manufacturing

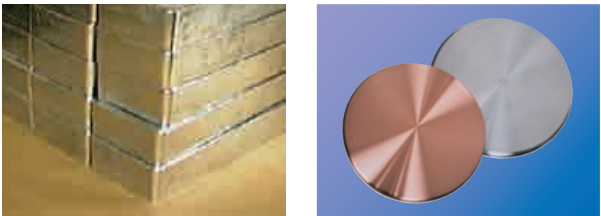


Product Types:

- Lead-based and lead-free solder feedstock
- Low alpha tin-based anodes for plating systems
- SnO and Sn-MSA for plating solution material

Custom Development

Honeywell's development team will partner with customers to create custom alloys.



Honeywell RadLo™ Materials
Above: Solder Feedstock and Plating Anodes.
Right: Plating Solution Materials

RadLo Products are Available in 3 Alpha Grades:

- Low alpha grade (<0.01/counts/hr/cm²)
- Ultra-low alpha grade (<0.002 counts/hr/cm²)
- Super ultra-low alpha grade (<0.001counts/hr/cm²)

Our products are manufactured to meet 99.99% (4N) or higher purity.

Technology Leadership

- Advanced metrology processes based on industry-wide alpha measurement standards
- Proprietary refining techniques involving selective removal of alpha-emitting isotopes
- State-of-the-art research in alpha emitter properties and transport mechanisms supports development of next-generation products

Proven Solutions

Honeywell RadLo materials offer proven reliability in various applications. Our experience and expertise in low alpha manufacturing spans two decades.

Technical Support

We offer comprehensive technical guidance to support our customers' needs.

Products & Features

Honeywell Advantages

HONEYWELL RESOURCES:

- Application Support and Qualification Information
- Detailed Specifications
- Ordering Information

For Additional Information, Visit www.honeywell-lowalpha.com

Choose Honeywell RadLo Low Alpha Packaging Solutions



Honeywell RadLo™

Low Alpha Materials for Advanced Packaging Solutions



RESPONSIBLE CARE®
OUR COMMITMENT TO SUSTAINABILITY

Honeywell Electronic Materials

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China: 86-21-28942481

Germany: 49-5137-999-9199

Japan: 81-3-6730-7092

Korea: 82-2-3483-5076

Singapore: 65-6580-3593

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