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Rapid, Green Manufacturing Techniques for High-Density Interconnects in Advanced Semiconductor Packaging

Green single-step semiconductor process fabricating high-density interconnects 80% faster at lower cost.

Researchers at Purdue University have developed a semiconductor manufacturing method capable of creating multi-layer, multi-dimensional, high-density metal interconnect substrates at high-speeds using a single-step process for semiconductor fabs and packaging companies. This customized advanced membrane technology provides a low-cost, time-efficient, and green alternative compared to traditional redistribution layer (RDL) fabrication processes. Unlike current RDL fab processes, which require numerous steps for depositing metal and dielectric materials, the method developed at Purdue is a rapid, single-step process that simplifies RDL fabrication and has myriads of applications in advanced packaging. Moreover, this model significantly limits environmental impact by reducing energy consumption and water usage. Enabling high-volume production of advanced packaging without the need for expensive methods like photolithography and chemical polishing, this manufacturing technique holds extreme promise for reducing capital costs and accelerating the production of high-performance semiconductor chips.

Technology Validation:

Preliminary testing revealed that this method enables electrochemical deposition of complex metal layer structures in under 10 minutes, reducing fabrication time by 80% compared to traditional methods. This process results in 90-99% reduction in energy use and zero waste, leading to a 90% decrease in CO2 emissions.

Advantages:

-Supports multi-layer and multi-dimensional configurations

-Single-step process

Technology ID
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Category
Semiconductors/Fabrication & Process Technologies

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-Reduces manufacturing costs

-Time-efficient

-Environmentally sustainable

Applications:

-Semiconductor fabrication

-Semiconductor advanced packaging

-Semiconductor manufacturing

TRL: 4

Intellectual Property:

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Keywords: Advanced Packaging,Electrochemical Deposition,Glass Packaging Substrate,Mechanical Engineering,Micro & Nanotechnologies,Nanotechnology,Redistribution Layer (RDL) Interconnect,Semiconductor Manufacturing,Semiconductors,Single-Step Process,Multi-Layer Interconnects,High-Density Metal Interconnect,Green Manufacturing,Low-Cost Fabrication,High-Speed Fabrication,Environmental Sustainability