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Scaled-up Microdroplet Organic Synthesis with Solvent Recycling

A closed system using microdroplet and thin film reactions achieves dramatically accelerated, high-yield, and high-purity chemical synthesis while simultaneously recycling solvents, applicable across pharmaceuticals, agrobiosciences, and environmental science.

Researchers at Purdue University have developed a new closed system for conducting microdroplet and thin film reactions that also recycles solvents. The microdroplet technique improves reaction yield over traditional bulk methods from 9% yield to 93% yield for Claisen-Schmidt reactions, from 20% to 100% in Schiff-base reactions, from 14% to 86% for Katrizky coupling, and from 17% to 72% for Suzuki coupling. These chemical reactions demonstrate acceleration 15 to 7,700 times that of traditional bulk synthesis. As one example, in a Claisen-Schmidt reaction, the system fine-tuned by Purdue researchers exhibited chemical synthesis at a rate of 3.18 grams/hour with an 87% yield. In addition, the exceptional purity of reaction products has been verified by proton and carbon NMR analysis. This microscale approach can be implemented in applications including pharmaceutical research, chemical research, agrobioscience, and environmental science applications.

Related Publication:

High-yield gram-scale organic synthesis using accelerated microdroplet/thin film reactions with solvent recycling

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Advantages

-High Yield

-High Purity

-Highly Efficient

Technology ID

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Category

GreenTech/Circular Economy & Waste Reduction
Pharmaceuticals/Drug Discovery & Development
Chemicals & Advanced Materials/Materials Processing & Manufacturing Technologies

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Potential Applications

-Pharmaceuticals

-Agrobiosciences

-Environmental Sciences

-Chemical/Biochemical Research

TRL: 4

Intellectual Property:

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Keywords: microdroplet reaction, thin film reaction, solvent recycling, chemical synthesis, high yield synthesis, high purity product, accelerated reaction, gram-scale synthesis, pharmaceutical application, agrobioscience application, Chemical Synthesis, Chemistry, Chemistry and Chemical Analysis, Efficiency, Micro & Nanotechnologies, microbiology, Microfluidics, Research Tools, Solvent, Synthesis and Purification