Droplet Impingement Planar-Array-Micro-Reactor

A planar-array-micro-reactor structure that enables direct chemical conversion of liquid reagents

Researchers at Georgia Tech have created a planar-array-micro-reactor structure that enables direct chemical conversion of liquid reagents (liquid hydrocarbon fuels such as methanol, diesel, ethanol, etc.) upon their production in the form of micrometer size droplets. This causes direct impinging on a suitable combination of catalyst-loaded reaction layers. These reaction layers are placed in an intimate contact with the droplet ejector array.

Summary Bullets

- **Component Integration** – high degree of multi-functionality
- **Scalability** – throughput
- **Simple** – simple operations and robustness

Solution Advantages

- **Component Integration** – high degree of multi-functionality
- **Scalability** – throughput
- **Simple** – simple operations and robustness
- Compact
- Efficient hydrogen separation
- **Direct integration** – works with the fuel cell without use of any additional piping

Potential Commercial Applications

- Portable applications (portable reactors and portable fuel cells)
- Transportation applications
- Powering electronic devices
- Processing toxic reagents

Background and More Information

Higher energy storage densities are achieved by reforming liquid fuels such as methanol and ethanol to hydrogen and feeding the fuel cell directly. Using this to power electronic devices in the 1-100 W power range, such as cell phones and laptop computers, demands a simple, small, and low-weight design to compete with current

battery technology. Such distributed chemical processing may also be advantageous in processing toxic reagents where it may be safer to produce smaller amounts on site as they are needed rather than producing, transporting, and storing them in large quantities. In addition to compactness and portability, heat and mass transport limitations become less significant at smaller scales, allowing reactions to approach their intrinsic rate and for efficient heat transfer between reactor components.

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Publications

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