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Dow Corning Earns Prestigious R&D 100 Award for Thermal Management Solution Targeting Advanced Semiconductor Packaging

Dow Corning[®] TC-3040 Thermally Conductive Gel Raises the Bar for Thermal Management of High Performance Computing Applications

MIDLAND, MICH. – Nov. 7, 2016 – Dow Corning, a global leader in silicones, silicon-based technology and innovation, announced today that it earned a 2016 R&D 100 Award for *Dow Corning[®] TC-3040 Thermally Conductive Gel*, a silicone-based thermal interface material (TIM-1) designed to manage heat, and support reliable performance for advanced semiconductor flip chip applications. Developed in collaboration with IBM, Dow Corning's entry was among 300 finalists – including 14 other advanced technologies from The Dow Chemical Company, of which Dow Corning is now a wholly owned subsidiary. *R&D Magazine* presented its award to Dow Corning on Nov. 3 during the R&D Awards and Technology Conference held in Oxon Hill, Md., near Washington D.C.

"We are tremendously proud that our TC-3040 Gel won this coveted industry recognition, especially considering the incredibly innovative materials that it was competing against," said Andrew Ho, global market segment leader at Dow Corning. "But we were also confident that the uniquely powerful properties of silicone and our new proprietary filler technology enabled this breakthrough product to deliver outstanding benefits to semiconductor packaging companies, which are under tremendous pressure to manage the damaging heat inherent to advanced semiconductor devices."

As electronic devices continue to be packaged more densely together and their power increases to improve functionality, the industry will need innovative new materials to manage the increasing amount of heat generated during operation.

"The successful collaboration between IBM and Dow Corning scientists helped raise the bar for TIM-1 performance, as illustrated by TC-3040 Gel's high thermal conductivity with robust reliability," Ho said. "With the 3D InCites Award earned recently, the R&D 100 Award now marks the second citation this revolutionary product has received, and it further illustrates Dow Corning's commitment to collaborate with industry leaders to help customers proactively solve the semiconductor industry's most pressing challenges."

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Dow Corning[®] TC-3040 Thermally Conductive Gel is a one-part curable TIM-1 material designed to improve heat dissipation between an IC chip and a heat spreader. Its extraordinary thermal management capabilities deliver nearly two times the performance of other industry standard TIMs, and enable it to regulate the extreme temperatures within today's semiconductor packages. This advance gel features a combination of low modulus and high elongation, which enhances its stress mitigation capability. TC-3040 Gel also provides good wetting for excellent interfacial contact between the chip and lid, and can accommodate high filler loadings for enhanced thermal performance. It applies easily to achieve thin bond lines and provide excellent under-die coverage.

"The success of TC-3040 Gel derives from Dow Corning's fundamental expertise in both filler technology and silicone polymer chemistry as well as the robust collaboration between our internal technical team, value chain partners and global customers," said Darren Hansen, technology platform leader at Dow Corning. "TC-3040 Gel is an outstanding solution for demanding thermal management applications, and this award is a collective win for every stakeholder who contributed to its development."

Since 1963, the R&D 100 Awards program has identified revolutionary technologies newly introduced to the market. Widely recognized as the "Oscars of Invention," the R&D 100 Awards identify and celebrate the top technology products of the year. Past winners have included sophisticated testing equipment, innovative new materials, chemistry breakthroughs, biomedical products, consumer items and high-energy physics spanning industry, academia and government-sponsored research.

About Dow Corning

Dow Corning (dowcorning.com), a wholly owned subsidiary of The Dow Chemical Company, provides performance-enhancing solutions to serve the diverse needs of more than 25,000 customers worldwide. A global leader in **silicones**, silicon-based technology and **innovation**, Dow Corning offers more than 7,000 products and services via the company's Dow Corning[®] and **XIAMETER**[®] brands. More than half of Dow Corning's annual sales are outside the United States. Dow Corning's global operations adhere to the American Chemistry Council's Responsible Care[®] initiative, a stringent set of standards designed to advance the safe and secure management of chemical products and processes.

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About Dow

Dow (NYSE: DOW) combines the power of science and technology to passionately innovate what is essential to human progress. The Company is driving innovations that extract value from material, polymer, chemical and biological science to help address many of the world's most challenging problems such as the need for clean water, clean energy generation and conservation, and increasing agricultural productivity. Dow's integrated, market-driven, industry-leading portfolio of specialty chemical, advanced materials, agrosociences and plastics businesses delivers a broad range of technology-based products and solutions to customers in approximately 180 countries and in high-growth sectors such as packaging, electronics, water, coatings and agriculture. In 2015, Dow had annual sales of nearly \$49 billion and employed approximately 49,000 people worldwide. The Company's more than 6,000 product families are manufactured at 179 sites in 35 countries across the globe. On June 1, 2016, Dow became the 100 percent owner of Dow Corning Corporation's silicones business, a global company with sales of greater than \$4.5 billion in 2015, 25 manufacturing sites in 9 countries and approximately 10,000 employees worldwide. References to "Dow" or the "Company" mean The Dow Chemical Company and its consolidated subsidiaries unless otherwise expressly noted. More information about Dow can be found at www.dow.com.

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