

The path towards sustainable immersion cooling fluids – Evonik’s contribution

Dr. Mario Gomez, Director Global Thermal Management Fluids

Evonik Operations GmbH, Kirschenallee, 64293 Darmstadt, Germany

Immersion cooling is becoming increasingly important as technology for thermal management in the areas like internet data centers, electric vehicles as well as energy storage facilities. In immersion cooling systems the electronic components are placed directly into a container and immersed in a dielectric fluid. The heat generated by the immersed components is directly absorbed by the liquid. This technology offers several advantages when compared with air or indirect liquid (water-glycol) cooling. Firstly, immersion cooling fluids provide superior heat transfer capabilities. Having high relatively high thermal conductivity, these fluids can very efficiently dissipate heat resulting in better temperature control and allow systems to operate at very high power densities without the risk of overheating. This efficiency improvement simultaneously leads to a reduction of the energy consumption. Finally, the uniform cooling minimizes thermal stress extending the lifespan of components.

Evonik gathers decades of experience in the fields of technical and formulated fluids for various applications, may it be in personal care applications or in the lubricants world. Besides our interest in specialty base fluids, we also have a strong focus on specialty additives, which boost material or fluid performance or even provide desired performance parameters to a system. At the same time, sustainability is at the heart of our company, and our commitment to sustainability is an integral part of our purpose and strategic management. With the aim of leading beyond chemistry to improve life, today and tomorrow, we have begun our “green” transformation by fully and systematically integrating sustainability into all aspects of our strategy. In the future, we will focus and bundle our research and development in three major areas, and energy transition as well as circular economy are two of them.

The development of immersion cooling fluids, which are sustainable, contribute to lower energy consumption and can be potentially be recycled at their end-of-lifetime, is therefore fully aligned with our strategy. Besides our current dielectric fluid portfolio comprising certain additives, hydrocarbon as well as ester fluids, we aim to develop new materials by utilizing carbon dioxide as chemical building block. With the innovative technology of artificial photosynthesis, which is behind Evonik’s Reticus process, valuable specialty chemicals will be sustainably produced from carbon dioxide (CO₂) and green energy. By using CO₂ as a raw material, Evonik has started to develop new sustainable fluids, with a very low or even negative product carbon footprint. These materials will be applied in new transformative and more energy efficient processes, such as immersion cooling for data centers and other relevant application areas.

About the Author



Dr. Mario Gomez is currently Director Global Thermal Management Fluids at Evonik Oil Additives based in Darmstadt, Germany. Dr. Gomez has been with Evonik since 2001 in different positions in Research & Development, New Business Development as well as (Strategic) Innovation Management. Mario joined Evonik Oil Additives in September 2024 and took over the responsibility for the Global Thermal Management Fluids. He holds a Ph.D. in organic chemistry.