

From Promising Curiosity to Functional Core: A Ten-Year Journey with Ionic Liquids in Epoxy Composites

Dawid Zielinski,^a Andrea Szepecht,^a Marcin Smiglak^{a,*}

^a*Poznan Science and Technology Park, Adam Mickiewicz University Foundation, Poznan, Poland*

**marcin.smiglak@ppnt.poznan.pl*

Over the past decade, ionic liquids (ILs) have been explored, starting from scientific curiosity to becoming functional and versatile components in advanced epoxy resin systems and fiber reinforced composites. This presentation summarizes ten years of systematic research on the multifunctional application of ILs – not only as reactive hardeners but also as performance-enhancing modifiers.

Here we present a guided overview of publication cycle, presenting our research that comprises detailed studies, examining newly designed IL systems and their roles in modifying polymerization behavior, mechanical performance, thermal stability of epoxy-based composites, and different approach into composite fabrication¹.

Our research reveals interesting conclusions about control over crosslinking processes and influence on structural properties that ILs can deliver, marking a shift from exploratory experimentation to functional integration of ILs into the epoxy resins systems. This ten-year journey reflects both the scientific maturation of the field and the practical potential of ionic liquids to redefine how we think about multifunctionality of ILs in epoxide systems.

Was a decade of investigation worth the promise – or are we still chasing the multifunctional dream?

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References

1. Zielinski, D. Exploration to the potential of ionic liquids in the processes of manufacturing and modifying of epoxy composites, and assessment of their properties; Ph.D. Dissertation, Adam Mickiewicz University, Poznan, **2024**. Available online: <https://repozytorium.amu.edu.pl>



Prof. Marcin Smiglak is Vice-President of the Poznań Science and Technology Park (PPNT) and an expert in ionic-liquid chemistry. He earned his PhD in Prof. Rogers's group at the University of Alabama (USA). Since 2012 he has been developing ionic-liquid-based research at PPNT. As the head of the Materials Synthesis Group, he leads multiple interdisciplinary projects focused on composite materials and ILs-based systems. His work, conducted in collaboration with both academic institutions and industry partners, encompasses a wide range of topics including epoxy resins, photonic materials, polycarboxylates, natural polymers, and ionogels.