ACS virtual issue on deep eutectic solvents

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Editorial

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ACS Virtual Issue on Deep Eutectic Solvents

In the past decade, the use of deep eutectic solvents (DESs) as cost-effective ionic liquid analogues has attracted increasing attention. According to https://www.scopus.com/, already 1260 scientific papers have appeared involving DESs through May 1, 2017 (see Figure 1).

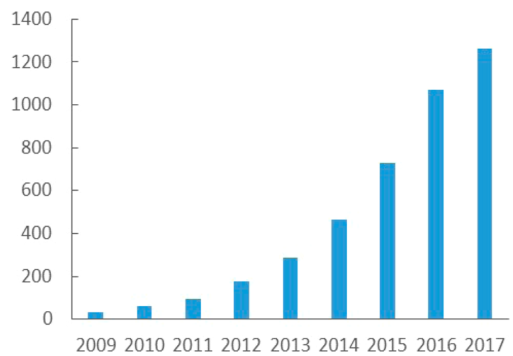


Figure 1. Total number of scientific papers on deep eutectic solvents up to May 1, 2017 (source: https://www.scopus.com/).

DESs are mixtures of at least one hydrogen-bond donor and at least one hydrogen-bond acceptor that show a large melting point depression upon mixing. The pure components are usually solids under ambient conditions, but the eutectic temperature is below room temperature. As a result, they are generally liquid at a variety of compositions near the eutectic point, allowing them to be used as room-temperature solvents for many applications.

This ACS Virtual Issue on Deep Eutectic Solvents focuses on the recent scientific and engineering advances related to DESs. It includes papers that have appeared in the last year and a half in *ACS Sustainable Chemistry & Engineering*, *Industrial & Engineering Chemistry Research*, *Journal of Chemical & Engineering Data*, and *Journal of Physical Chemistry*.

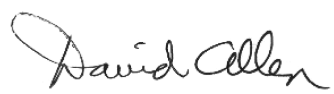
Several articles focus on the design and development of novel DESs. The choice of their constituents' type and molar ratio allows DESs to be tuned for specific applications. Full characterization can be achieved by experimentally determining their physicochemical properties or by theoretically predicting these properties, including the development of appropriate molecular models and quantitative structure−property relationships. Also, the properties of DESs in combination with other chemicals have been determined. It should be noted that DESs are already mixtures themselves, so many papers on DES systems actually involve ternary or quaternary mixtures.

DESs have been investigated primarily as reaction or separation media. Many chemically oriented papers focus on catalysis or biocatalysis in DESs, whereas materials-oriented papers focus on the production of (nano)materials in DESs, the confinement of DESs in micropores, and their structure at interfaces. Also, some papers involve the use of DESs as alternative room-temperature electrolytes, e.g., for use in batteries or capacitors.

In the field of separation technology, most papers present either vapor−liquid equilibrium or liquid−liquid equilibrium data for systems containing DESs. For example, several DESs have been developed as new absorbents for CO_2 or SO_2 capture from postcombustion flue gas. Moreover, other DESs have been applied as extractants, e.g., for the recovery of natural products from biomass or the removal of sulfur-containing aromatics from diesel. Finally, in some papers DESs have been investigated as entrainers in extractive distillation.

In this virtual issue, we have tried to bring these papers together in order to highlight the many ways in which chemists, materials scientists, and chemical engineers are investigating the full potential of these innovative solvent mixtures. We hope that it stimulates the scientific and engineering communities and contributes to the discovery of other new and even more promising DESs as well as their cost-effective application in future technology and sustainable processing.

Maaike C. Kroon, Associate Editor, *Journal of Chemical & Engineering Data*



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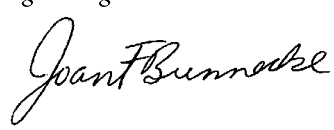

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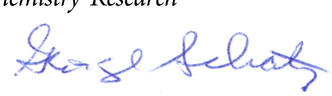

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Notes

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