Surfactant-driven Strategies for Sustainable C–H Activation: Progressing Towards Mild Reaction Conditions

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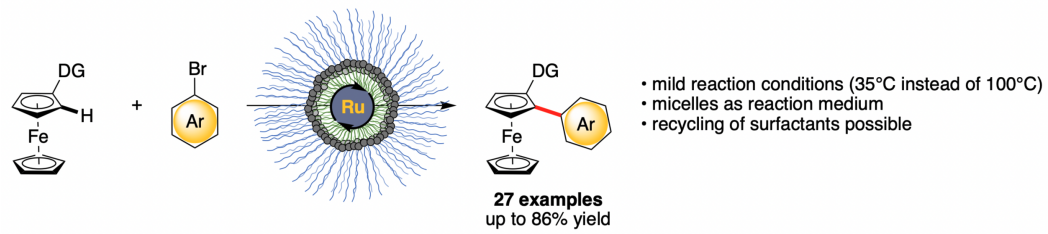
Sustainability has become a top priority for every chemistry practitioner! Considering the development of a new reaction or that of a chemical process, sustainability, waste and energy minimization have become highly significant. The urgency has been further reenforced with the potential for a ban of several reprotoxic polar aprotic solvents such as DMF and NMP through the REACH regulation.[1] Alternatives for such reaction media are indispensable. In the last decade, micellar conditions in bulk water have emerged as promising alternatives for several transformations such as a variety of cross-couplings or amide bond formation. In clear contrast, only a handful of examples emerged for C–H activations under micellar conditions, and the rare examples often require high temperatures.[2]

Our research focuses on the development of new catalytic systems for mild C–H activations occurring under micellar conditions. Two approaches are envisioned: 1) the careful design of additives to commercially available surfactants[3] or 2) the implementation of novel designer surfactants, able to facilitate challenging C–H activations at ambient temperature.[4]

Remarkably, with newly designed surfactant obtained *via* installation of an additional ligand at the core of a commercially available surfactant in hand, we were able to lower the reaction temperature for the ruthenium C–H arylation of ferrocenes from 100°C to 35°C. Our conditions have shown to tolerate a broad spectrum of functional groups with yields up to 86% and a high chemoselectivity, enabling the late-stage functionalization of active pharmaceutical ingredients and natural products.



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