Gel networks as reaction media: performing air-sensitive photoredox catalysis under aerobic conditions

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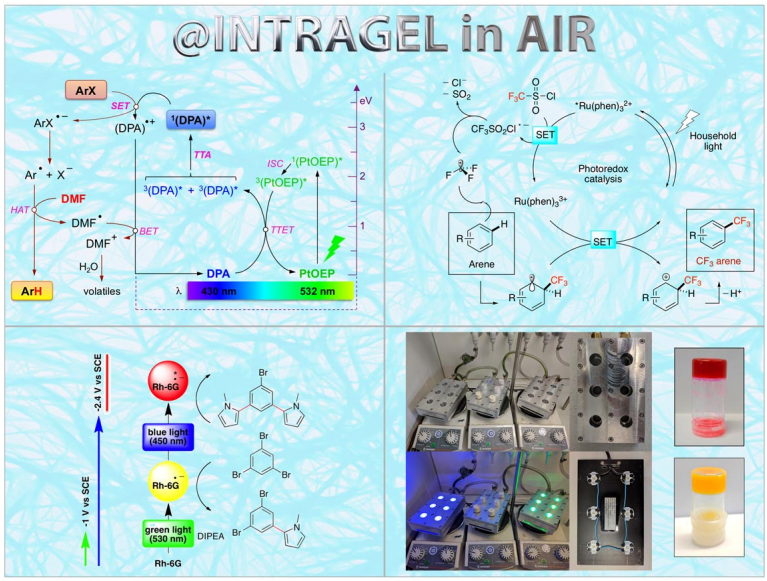
Nature uses confined and compartmentalized environments such as organelles to carry out chemical reactions under mild conditions with a precise control on kinetics and selectivity. Over the last few decades, this has served as an inspiration to develop artificial nanoreactors based on directed self-assembly of small molecules through non-covalent interactions.[1] Within this context, photochemistry can benefit from confined spaces, for example when performed in mesoporous inorganic materials, microemulsions, micelles, vesicles, polyelectrolyte multilayered capsules, liquid foams, and gels.[2] The confinement may improve photochemical processes by influencing key aspects, such as light absorption and the lifetime of redox intermediates.[3] Additional advantages of confined media for photochemical reactions may include large reaction active areas, the possibility of tailoring additional functionalities to the microreactor environment, and the reduction of overheating and overconcentration effects.[4] In this talk, our recent advances on the use of supramolecular gels as confined microenvironments for performing air-sensitive photochemical processes under aerobic conditions will be discussed, including the photoreduction of aryl halides via triplet-triplet annihilation-based photon upconversion (TTA-UC)[5] as well as C–C cross-coupling reactions involving C–halogen and C–H bond photoactivation.



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