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Discovery of catalytic steps in complex radical reactions

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A triple-jump model is invoked to describe complex catalytic chemical reactions involving radical reactants. The model consists of three sequential reactions or phases, beginning with the production of radicals, followed by the trapping, hydroxylation or addition reaction and ending with the conversion from unstable intermediates to final, more stable, products. This model improves the understanding of catalyzed steps using isolated reaction phases and electron paramagnetic resonance spectroscopy. For X-ray irradiation of gold nanoparticle aqueous solutions, hydroxyl radicals were found to be scavenged by nanoparticles in the formation phase. Stabilization was unaffected by gold nanoparticles due to the high concentrations of radical trapping reagents, whereas conversion was significantly catalyzed. This observation indicates that reactions need to be examined before they can be used to report the amount of analyte in the presence of nanoparticle catalysts, a conclusion important to understanding reactions such as DNA strand breaks, polymerization and hydroxylation reactions, which are critical to many fields including X-ray nanochemistry.

Biography

Jennifer Lien completed her PhD at UC Davis at the age of 29 years and began her postdoctoral studies with the Innovative Genomics Institute (IGI) out of UC Davis shortly after. She has published 6 papers in the field of nanochemistry, with a couple more currently under review.

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