

## Development of novel bioorthogonal conjugation chemistry

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Cysteine bioconjugation is a technique that utilizes cysteine as a reactive linker to connect proteins with synthetic functional groups under physiological conditions. These synthetic functional groups can include fluorophores, pharmacophores, or bioorthogonal handles, allowing for specific and controlled conjugation.

Cysteine bioconjugation is a widely used method for modifying proteins in both biological research and the development of protein-based therapeutics. Among the 20 canonical amino acids, cysteine has a relatively low abundance in proteins (1.9%) and possesses a highly reactive sulfhydryl group with a pKa value of approximately 8.5. These characteristics make cysteine an excellent choice for achieving selective and controlled modifications of proteins. Despite the existence of numerous cysteine conjugation methods, the approach involving S-S bond formation has received limited attention in terms of research and study. Here in we described the novel bioorthogonal conjugation chemistry for various biological applications.