

Specific Amide-Forming Reaction Targeting Biomolecules

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Carboxylic acids, amines, and alcohols, which are most common and representative polar functional groups, provide structural scaffolds for biomolecules such as proteins and lipids by formation of carboxamides or esters. Therefore, it should be advantageous to target the frequently occurring functional groups (carboxylic acids, amines, and alcohols) for chemical modification of the biomolecules to elucidate their functions. For this purpose, it would be an important issue to develop a new strategic approach to specific recognition and transformation of the target functional groups.

We have already found a catalytic system to activate carboxylic acids by a combination of chlorotriazines and tertiary amines; the reaction takes place in common protic solvents like water and alcohols. In addition, we succeeded to develop artificial acyltransferases utilizing host compounds, and a highly accelerated dehydrocondensation of amphiphilic substrates at a micellar interface. On the basis of these findings, we have now developed a specific amide-forming reaction targeting carboxylic or amino groups of biomolecules by taking advantages of their innate abilities for molecular-recognition or self-organization.