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Development of Novel Pyrrolidine Organocatalyst

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Organocatalysis is a relatively new and popular area within the field of chiral molecule synthesis. It is one of the main branches of enantioselective synthesis with enzymatic and organometallic catalysis. In recent years, immense high quality studies on catalysis by chiral secondary amines were reported. These progresses instantly led to different organocatalytic activation concepts, so thousands of researchers from academia and the chemical industry are currently involved in this field and new ideas, new approaches, and creative thinking have been rapidly emerged.

Organocatalysts, some of which are natural products, appear to solve the problems of metal catalysts. Compared to metal-based catalysis, they have many advantages including savings in cost, time, and energy, easier experimental procedure, and reduction of chemical waste. These benefits originate from the following factors. First, organocatalysts are generally stable in oxygen and water in the atmosphere, there is no need for special equipments or experimental techniques to operate under anhydrous or anaerobic conditions. Second, organic reagents are naturally available from biological materials as single enantiomers that they are easy and cheap to prepare which makes them suitable for small-scale to industrial-scale reactions. Third, in terms of safety related catalysis, small organic molecules are non-toxic and environmentally friendly.

Therefore, the purpose of this research is to develop novel synthetic methods and design for various organocatalyst. Furthermore, it is expected that these organocatalysts can be applied to a variety of asymmetric reactions and study the transition state of these reactions using a metal sulface. Here, we report the synthesis of unprecedented organocatalysts, proline and pyrrolidine derivatives with quaternary carbon center.

Keywords: organocatalysts, proline, pyrrolidine