Efficient Method of Synthesizing Gamma²-Amino Acids for Applications in Medicine, Materials, Healthcare

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The Wisconsin Alumni Research Foundation (WARF) is seeking commercial partners interested in developing a highly efficient, three-step method of synthesizing γ²-amino acids.

OVERVIEW

Unnatural polymers that contain β- and γ-amino acids are known as "foldamers." These foldamers form long-lasting, predictable structures that are very stable and resistant to proteolytic degradation. They can be designed to interact with specific targets and have applications in medicine, materials and general healthcare.

γ²-amino acids are an important type of non-natural amino acid, but they are difficult to make. Current methods are very inefficient and not useful for scalable synthesis or the synthesis of structurally diverse products.

THE INVENTION

UW-Madison researchers have developed novel compounds and methods for synthesizing γ²-amino acids and related products. The highly efficient and enantioselective methods are based on Michael reactions of aldehydes with highly reactive nitroethylene. The reactions are catalyzed by small amounts of readily prepared chiral pyrrolidines in the presence of commercially available and inexpensive carboxylic acids as cocatalysts. The Michael products, α-substituted-γ-nitrobutyl aldehydes, are valuable building blocks for organic synthesis and can be converted to γ²-amino acids and their derivatives.

APPLICATIONS

• Development of pharmaceutically relevant molecules, including antibiotics, hormone mimetics, fat absorption inhibitors and others
• Development of new materials for information storage and catalysis
• Beauty products
• Basic research on foldamers
KEY BENEFITS

- Enantiomerically pure $\gamma^2$-amino acids can be made from readily available and inexpensive starting materials.
- May reduce the cost of manufacturing $\gamma$-peptide products
- Steps may be combined to develop a one-pot method for preparing $\gamma^2$-amino acids.
- High overall yields
- Minimum use of chromatography for purification
- Amenable to large scale synthesis
- Mild conditions allow diverse functional groups.
- Provides—for the first time—a catalytic method for efficient $\gamma^2$-amino acid synthesis
- Capable of producing multiple types of chiral organic compounds

ADDITIONAL INFORMATION

Related Technologies

Publications

Tech Fields
Materials & Chemicals - Synthesis

CONTACT INFORMATION

For current licensing status, please contact Rafael Diaz at rdiaz@warf.org or 608-960-9847.

FIGURES

An efficient three step process for synthesizing gamma$^2$-amino acids.