Design Of Functional Protein Materials Based on Beta-Rippled Sheet Architectures

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BACKGROUND

The rippled sheet was proposed by Pauling and Corey as a structural class in 1953. Following approximately a half century of only minimal activity in the field, the experimental foundation began to emerge, with some of the key papers published over the course of the last decade. Researchers at UC Santa Cruz have explored the structure of and have discovered ways to form new beta rippled sheets.

TECHNOLOGY DESCRIPTION

Jevgenij Raskatov's lab at UC Santa Cruz has determined the structures for a wide variety of rippled β sheet structures. Generally these structures form fibrils of rippled antiparallel cross-β dimers. One general structure is an (L,L,L)-$(FX_1F)_k$ dimerized with (D,D,D)-$(FX_2F)_k$ where F is phenylalanine, X_1 and X_2, can be any amino acid, and k is an integer greater than or equal to 1. Examples of X1 and X2 include phenylalanine, tyrosine, and tryptophan.

Other structures include (L,L,L,L,L,L)-$(MVGGVV)_k$ dimerized with (D,D,D,D,D,D)-$(mvggvv)_k$; (L,L,L,L,L,L)-$(KLVFFAE)_k$ dimerized with (D,D,D,D,D,D,D)-$(klvffae)_k$; and (L,L,L,L,L)-$(AILSS)_k$ dimerized with (D,D,D,D,D)-$(ailss)_k$; where k is an integer greater than or equal to 1.

Therapeutic compositions include a D-peptide with the sequence KLVFFAE that can bind to the Alzheimer's disease associated peptide Aβ42 that is conjugated to a deamidation agent. The deamidation agent then can act on K16, E22, or D23 of wild type Aβ42 and reduce the neurotoxicity of Aβ42.

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INVENTORS

- Raskatov, Jevgenij

OTHER INFORMATION

KEYWORDS

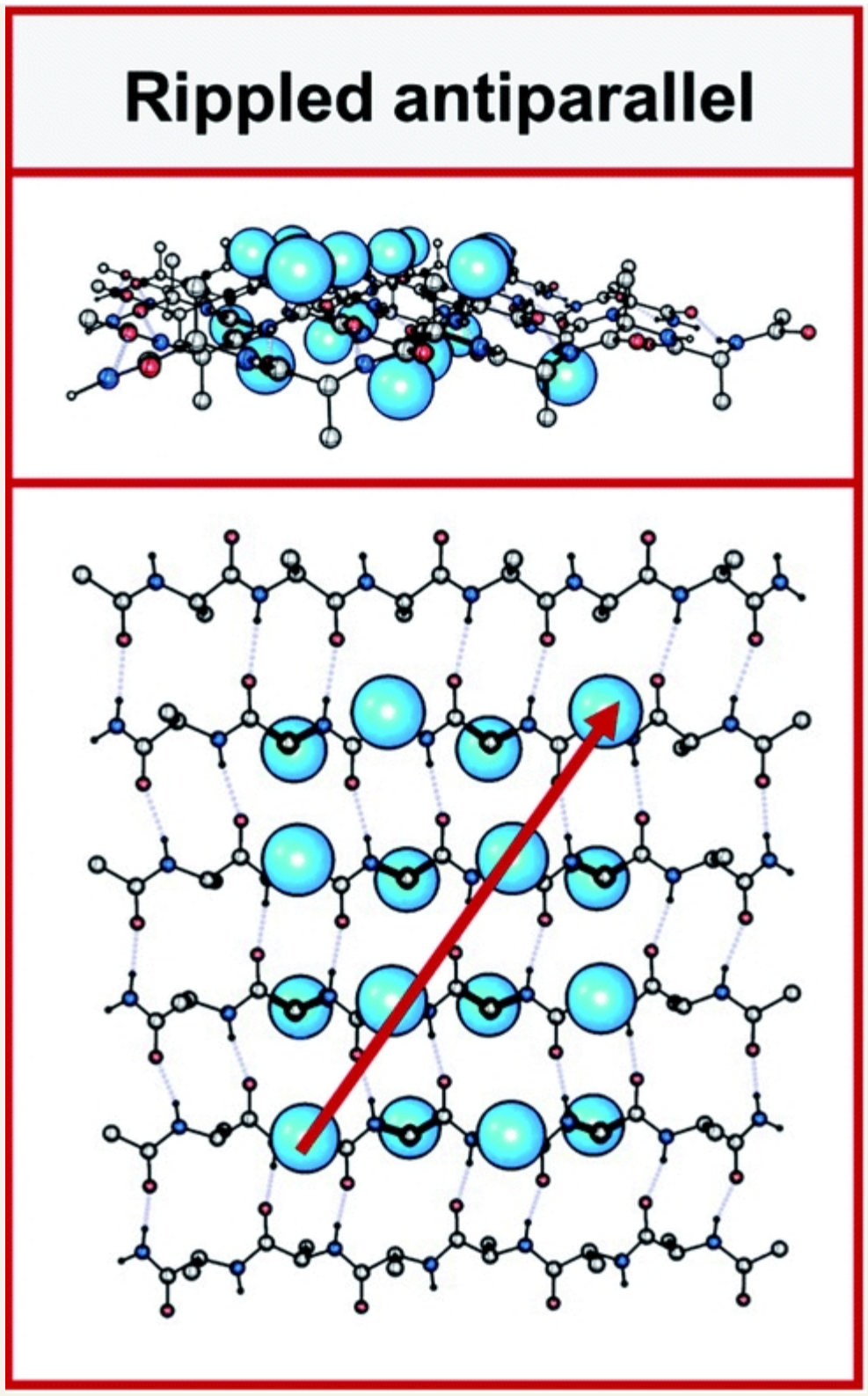
beta rippled sheet, secondary structure, peptide, D-peptide

CATEGORIZED AS

- **Materials & Chemicals**
  - Polymers
- **Medical**
  - Delivery Systems
  - Disease: Central Nervous System
- **Nanotechnology**
  - NanoBio

RELATED CASES

2021-986-0, 2023-906-0, 2023-930-0



APPLICATIONS

Potential applications include:

- Nanomaterials
- Fluorescent signaling
- Therapeutic peptides
- Drug targeting

ADVANTAGES

These are fully unexplored structures that are implicated in potentially disrupting fibril formation in diseases like diabetes and Alzheimer's Disease.

INTELLECTUAL PROPERTY INFORMATION

Patent Pending

RELATED MATERIALS

- A crystal-structural study of Pauling–Corey rippled sheets - 01/21/2022
- Understanding and controlling amyloid aggregation with chirality - 10/01/2021
- Defining the Landscape of the Pauling-Corey Rippled Sheet: An Orphaned Motif Finding New Homes - 04/26/2021

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