



TECHNOLOGY INFO SHEET



Development of a packed bed reactor for the synthesis of peptides and foldamers

Development status

Proof of concept

Development

▶ Product development and Testing

Entering market

Market development

IP status

In priority year

PCT I.

PCT II.

▶ National/regional phase

Validation

Challenge

Biopolymers, constituting the basis of life, like oligo- and polysaccharides, oligo- and polynucleotides, and oligo- and polypeptides are of considerable interest. Peptide drugs, like vasopressin, goserelin, exenatide, octreotide, etc. form one of the practical applications of peptides. Proteins, in the form of vaccines containing monoclonal antibodies, are applied in the therapy of cancer therefore nowadays in the development of peptide drugs and in the synthesis of biologically active peptides there is a constant need for synthetic methods, thus numerous methods have been developed for the coupling of amino and carboxyl functional groups containing amino acids in a given sequence. Nowadays chemically prepared synthetic peptides are exclusively made by the application of solid phase peptide synthesis (SPPS) method, which rendered the synthesis of longer peptide chains possible only by using a high amino acid excess.

Technology

The technology developed at the University of Szeged is a continuous flow chemical method for the solid phase synthesis of peptides and enantiomers, diastereomers, stereoisomers, mixtures, salts and/or derivatives. Using this continuous flow technology to the solid phase peptide synthesis the amino acid excess can be reduced to a range of 1 to 1.5 equivalents and peptides of high purity can be synthesized with practically complete couplings and in good yields if the synthesis is performed at elevated temperature and pressure. According to the invention nearly 100% coupling can be reached also when using low amino acid excess during the peptide

synthesis and even in the case of peptides comprising strongly structure promoting amino acids the yields are excellent.

Keywords

Peptide, peptide synthesis, solid phase synthesis, continuous flow

Benefits

- ▶ Excellent coupling with 1.5 equivalent and short coupling time.
- ▶ Low amino acid excess with nearly 100% coupling.
- ▶ Application is suitable for the preparation of all 20 proteinogenic amino acids, difficult sequences, foldamers, β -Sheet forming longer sequences and other “exotic” amino acids.
- ▶ Low consumption on solvent.
- ▶ It is a cost and energy-effective method.
- ▶ With scale up the method is useful in the synthesis of large peptide quantities.

Development status

Currently the method and the prototype are developed and tested in laboratory environment, and we are working on developing the prototype into a product and to go to industry level. The synthesis of various difficult sequences was carried out by the utilization of 1.5 equivalent amino acids with high conversion. Thus, the synthetic effectivity of the technology is demonstrated. Furthermore, the potency and cost-effectiveness of the technology is demonstrated by the synthesis of foldamers, where the costs of a regular or microwave assisted synthesis was reduced by the utilization of the continuous flow synthesis with 70%. In addition, long, β -sheet forming peptides as further compounds with regular synthetic difficulties were synthesized with high conversion values.

IP status

The Hungarian patent application (P1400114) was submitted in 2014. The PCT examination (PCT/HU2015/000022) was submitted in 2015. The PCT examination was extended to a European patent application (EP 3110828) in 2016.

What we are looking for

The university is looking for partners to start the product development phase. The university is open to license the patent application and/or is ready to negotiate from alternative utilization forms such as partnering, R&D collaborations, and so on.



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