TECHNOLOGY

Defect-free dendrimer synthesis through proportionate branching

OVERVIEW

Dendrimers are nanoparticles of synthetic monomers with applications in commercial paints, blood substitutes, nanomaterials, sensor technology. Dendrimers are also building blocks for targeted drug or gene delivery. The dendrimers open architecture forms hollow cavities within the branches that can encapsulate molecules such as drugs or DNA. Until recently, dendrimer size has been limited by defects attributable to steric congestion between the branches.

Investigators at the University of Maryland have developed a method for synthesizing highly branched dendrimers that avoid the steric congestion caused by traditional dendrimer synthesis strategies.

The method enables the synthesis of defect-free macromolecules with a greater number of branches.

In tra portionately – the number of branches grows expo ed. The bioinspired strategy disclosed by the inventors allow tegy allows the branches to grow exponentially from the core anches to grow exponentially from the periphery to the core.

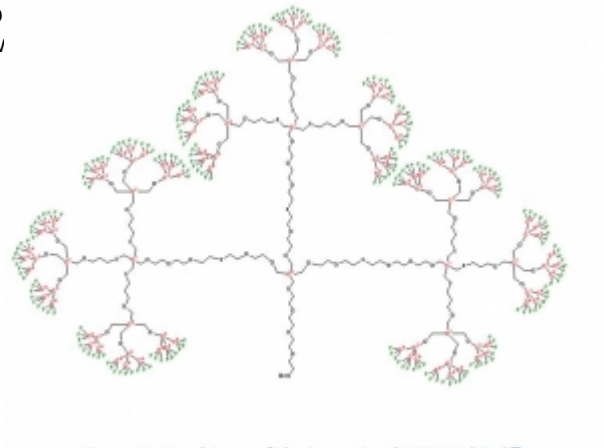

Figure 2: Dendrimer of the invention (MW 9.1 kDa)¶

The investigators demonstrated this approach by synthesizing two novel dendrimers amenable to 19F Magnetic Resonance Imaging (MRI).

APPLICATIONS

There is a growing interest in dendrimers for applications in chemistry, materials science, nanotechnology, and medicine. The dendrimers of the present invention are ideally suited for use in detection of nucleic acid sequences, antibodies, antigens, immune complexes, and pharmaceutical compounds. In Vivo and in vitro diagnostic procedures like radioimmunologic assay, electron microscopy, ELISA, X-ray imaging, and magnetic resonance imaging (MRI) would also benefit from the increased control demonstrated by the method.

ADVANTAGES

Increased branch length relieves steric congestion and facilitates the synthesis of dendrimers with bulky functional groups, permitting synthesis of defect free dendrimers with functions that were not achievable until now. - Dendrimers with 81 or 243 fluorine atoms have currently been optimized. - The potential to build even larger (greater than 243 fluorine) defect free dendrimers that can be optimized for application as MRI imaging agents.

STAGE OF DEVELOPMENT

Proof of concept has been established with the synthesis of the two fluorinated dendrons for use in 19F MRI imaging that could not be synthesized using single exponential growth.

MEW (09/2019)

R&D REQUIRED

Further research and development must be done into new applications for the described technology, and further development of the 19F MRI fluorinated dendrons is required.

LICENSING POTENTIAL

UM seeks to develop and commercialize by an exclusive or non-exclusive license agreement and/or sponsored research with a company active in the area.

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PATENT STATUS

US Patent.9,133,114

LICENSE STATUS

Available for exclusive license

CATEGORIES

- Imaging devices
- Diagnostics
- Platforms
- Therapeutics

- Engineering
- Biomaterials

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ATTACHMENTS

- Download Marketing Summary BY-2012-068_09_30_2019.pdf

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