MCR dendrimers

Problem to be solved
All previously existing dendrimers require special, branched and partially protected or polyreactive building blocks for their synthesis. The divergent and convergent methods are supplemented by orthogonal synthesis, the convergent two-step method, the double exponential method, solid-phase synthesis or coordination chemical synthesis in order to introduce a limited degree of functionality.
A disadvantage of all these syntheses is the limited range of dendrimers with varying structures that can be produced, and the concentration to few dendron forming functional groups. This limitation is founded in the basic structural types used as conventional Dendrimer building blocks, such as acrylonitrile, acrylic ester or dihydroxybenzyl alcohols. In these dendrimers, combinations of varied internal and terminal groups can be achieved only with a considerable synthetic effort.
The technology presented here offers the possibility of synthesising dendrimers with almost any combination of branch lengths, degree of branching, internal and terminal groups and generation by means of multicomponent reactions which have considerable advantages over the standard methods referred to because of the wide range of variants that can be produced.

New method
The technology provides a new method of producing dendrimers in any combination by means of multiple iterative multicomponent reactions, e.g. with acidic, alkaline, hydrophilic, lipophilic, sugar and other functional groups. The method produces a branched compound by means of reaction based branching of the 3 to 7 components, and not by means of branched building blocks. In a four-component reaction, as many as $10^9$ variants can be produced up to the third generation if only 10 different building blocks per component are used, even without taking into account additional positional isomers. It should therefore be possible to find a suitable combination for almost every dendrimer application. The method does not normally require inert gas or water exclusion and can be carried out in solvents such as alkanes, esters, alcohols or even water.

Applications
Dendrimers are spherical, highly branched polymers used in the fields of drug delivery and drug targeting, DNA/RNA delivery, imaging, protein labelling, protein crosslinking and protein separation, coagulation inhibition, and surface, cell and tissue recognition. They are also used as macroamphiphiles and catalyst supports. Compared with conventional dendrimers, MCR dendrimers can be produced in an almost unlimited range of structures and are at the same time easy to synthesise. They are chemically defined, monodisperse and can be constructed combinatorially, iteratively and sequentially, using commercially available building blocks or building blocks readily available from other sources, i.e. not only homooligomers but also heterooligomers of defined sequence and combination can be assembled. They can therefore be selectively furnished with the desired properties.

We are seeking partners for developing specific dendrimers or dendrimer applications based on the technology, or alternatively a licensee for the technology as a whole.

Patent situation
In case of interest, we will be pleased to inform you about the current status.

www.inventionstore.de: Kostenlose E-Mail-Service zu neuen patentierten Spitzentechnologien.