

New Carriers Based on Macrocyclic Derivatives of Glycoluril

Scientists of Masaryk University have prepared a completely new compounds that may find wide application in the healthcare, pharmaceutical, or food industry.

The new compounds are shaped like a short tube and resembles a single cell of a bamboo trunk. Therefore, they were named bambusurils.

Bambusuril's unique properties lie in its ability to bind negatively charged substances, thus serving as a carrier. It could be used, among others, to determine the quality of food, purify water or diagnose particular diseases.



Seeking

Development partner
Commercial partner
Licensing

IP Status

Patents in force:
CZ, DE, FR, GB and US

Contact

Radoslav Trautmann, Ph.D., MBA

Masaryk University
Technology Trasfer Office
✉ trautmann@ctt.muni.cz
☎ +420 54949 8218

TECH OVERVIEW

The invention encompasses a new class of macrocyclic compounds, called bamboo[n]uriles (hereafter bambusurils), with 4 to 24 glycoluril units, wherein a glycoluril is a bicyclic molecule capable of binding other substances through non-covalent interactions. Bambusurils can bind anions in their structure with unusual efficiency. Bambusurils can compete with functionally similar and well-known macrocyclic substances in terms of their properties, but their structure can be modified more easily, thus allowing their properties to be finetuned depending on the intended use. The preparation of the basic bamboo[6]uril is simple, and the used precursors and solvents are cheap and readily available.

The flexible macrocyclic chains of bambusurils can easily adapt to the shape of the substance with which they interact. Bambusurils are soluble, especially in mixtures such as chloroform/methanol or chloroform/dimethylsulfoxide, but they also dissolve in water in the presence of specific ions. By appropriate choice of substituents, bambusurils can be modified to achieve solubility in the desired solvent. Bamboo[n]uriles can be easily modified, for example by introducing bulky substituents, to significantly affect their properties due to the conformational change of the macrocycle. It is also possible to introduce a suitable functional group on the macrocycle to allow its attachment to a desired substrate, such as the surface of a polymer, silica gel or metal (nano)particle.

BENEFITS

Bambusurils are able to bind anions in their structure with unusual efficiency, serving as their transporter. Another advantage is the adaptability of their structure, and thus their properties, to specific applications. The ease of preparation is also an undeniable advantage – the starting compounds and solvents are cheap and readily available. For this reason, researchers continue to investigate bambusurils for the preparation of anion sensors, ion-selective electrodes, and other applications.

APPLICATIONS

- Water purification
- Removal of substances from solutions
- Separation of gas mixtures or organic vapours
- Use for materials with an ion exchange function
- Chelating agents for radioisotopes of iodine and technetium
- Stationary phases for liquid chromatography for chiral separations
- Active separation surfaces for chromatography or in active surfaces of sensor electrodes
- Transport and routing of drugs in the body
- Matrices carrying flavour or drug substances

COMMERCIAL OPPORTUNITY

- Partner for licensing the technology and its application in practice
- Investment partner to develop the technology and possibly establish a spin-off company