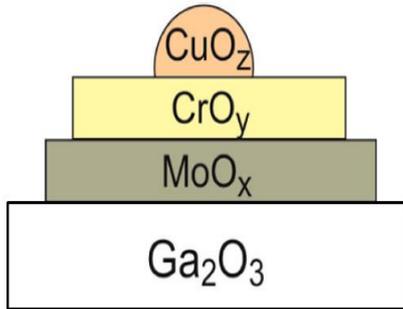


Efficient H₂O decomposition

Transition-metal catalyst for the photocatalytic H₂O decomposition

Invention

Due to the low overvoltages and excellent kinetics for the hydrogen evolution reaction, mainly precious metals such as Pt, Rh, Au and containing precious metal oxides such as RuO₂ and Rh_xCr_{2-x}O₃ have been used as co-catalysts for photocatalytic hydrogen evolution.



Catalyst Composition Pattern

The large-scale implementation of sustainable hydrogen production, however, requires the development of new precious metal-free and thereby cost-effective co-catalysts. At this stage, the cheap and readily available transition metal are on offer. Therefore, the development of Cu-based co-catalysts is attracting increasing attention. So far, binary Cu-containing co-catalysts have been explored, which, however, show significantly lower reaction rates, compared to the precious metal-based catalysts.

Commercial Opportunities

The invention "Efficient H₂O- decomposition" refers to the synthesis of a precious metal-free mixed oxide catalyst by deposition of transition metal oxides on an n-type semiconducting material. A typical representative is e.g. obtained by the deposition of MoO_x, CrO_y, and CuO_z on Ga₂O₃.

This quaternary catalyst systems exhibit activity and stability in the photocatalytic decomposition of water, which is comparable to those with established precious metal-containing catalysts systems. But in fact, they are more cost-effective. The new catalyst systems are also easy to regenerate and therefore make long service lives possible.

Current Status

The invention has been applied for patent. Do not hesitate to ask for status details. A proof-of-principle has been provided. On behalf of the Ruhr-Universität Bochum, we offer interested companies the opportunity to license or purchase, as well as to further develop the technology.

An invention of Ruhr-Universität Bochum.

Competitive Advantages

- Precious metal-free
- Easy regenerable
- High quantum yield
- Highly scalable synthesis of three readily available metals

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