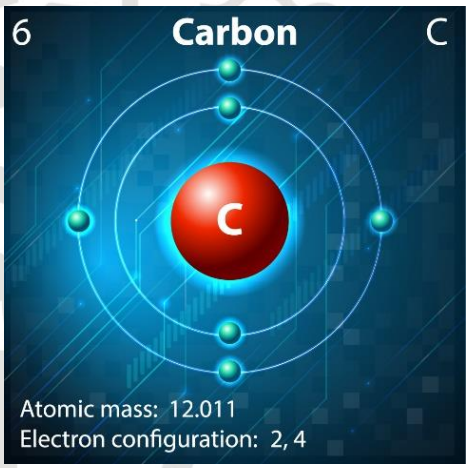

REDUCING GLOBAL WARMING BY REVVING UP CATALYTIC REACTIONS

Yimin A. Wu

Some Carbon dioxide levels in the atmosphere keep rising, warming up our planet. And that has many researchers looking at two key catalytic reactions — photocatalysis and electrocatalysis — that can convert CO_2 into hydrocarbons. It's an exciting idea, using either sunlight or electricity to activate a catalyst that transforms CO_2 pollution into fuels and other valuable chemicals.

However, current techniques tend to create products with just a single carbon atom. That's a problem, because single-carbon products have lower energy densities comparing with more carbon atoms. And the smaller the volume of multi-carbons you create, the more expensive it is to separate them out.

So WISE researcher Yimin Wu and his colleagues were invited to give an overview of the strategies to make these systems more economically viable. In a comprehensive review article, they highlight key strategies for favouring the production of multi-carbons.

Besides copper, the most promising catalyst for converting CO_2 to multicarbon products, other molecular catalyst should also be considered. For example, using nitrogen-doped ordered mesoporous carbon can produce clean-burning ethanol fuel.

Meanwhile, to optimize the reactions triggered by those catalysts, the researchers stress the importance of considering a wide range of factors — from thermodynamic energy barriers to the inner molecular structure of catalysts. They also suggest improvements to reactor designs, discussing how continuous-flow cells are better suited for industrial applications than the H-type cells used in small-scale studies.

By identifying the most promising pathways to better catalytic systems, Wu and his colleagues are helping bring this cleantech out of the laboratory and into the market.

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