Using light-harvesting polymers to speed up photosynthesis in algae

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A team of researchers at the Chinese Academy of Sciences has found a way to speed up photosynthesis in algae by applying a conjugated polymer. In their paper published in the journal *Science Advances*, the

group describes experiments with applying polymers to algae and what they learned from them.

As the world continues to wrestle with the problem of global warming, scientists are searching for new ways to solve the problem—one approach involves finding an immediate replacement for gasoline. In this new effort, the researchers looked into the possibility of speeding up the photosynthesis process in algae for making biofuels.

Prior work with algae has shown it to be unsuitable for use in creating biofuels—its photosynthesis process is slow, resulting in low yields of proteins and fatty lipids—the parts of the plant needed to make biofuels. In this new effort, the researchers looked into the possibility of boosting the plants' photosynthesis rate, and by extension, its production of proteins and fatty lipids, by applying a type of conjugated polymer to the surfaces of their cells.

To test their idea, the researchers used an electrostatic process to force the synthetic, light-harvesting polymer PBF to adhere to the plant's cell surfaces. They found that doing so forced an immediate increase in the rate of overall growth—in the best case, by 110 percent. Testing showed the plants to have elevated levels of ATP and oxygen created by photosynthesis—the researchers also found higher levels of proteins and lipids. As an additional test, they also tried applying PBF to the roots of a flowering plant. They found that high doses tended to stunt growth, but low levels made the plant grow faster, leading to early maturation.

The work is still in the preliminary stages, thus, it is not yet known how well the process could be ramped up or commercialized, or how well it would stack up against other biofuel sources. But thus far, it does suggest that algae may yet turn out to be an alternative to fossil fuels.

More information: Xin Zhou et al. Artificial regulation of state

transition for augmenting plant photosynthesis using synthetic light-harvesting polymer materials, *Science Advances* (2020). DOI: 10.1126/sciadv.abc5237