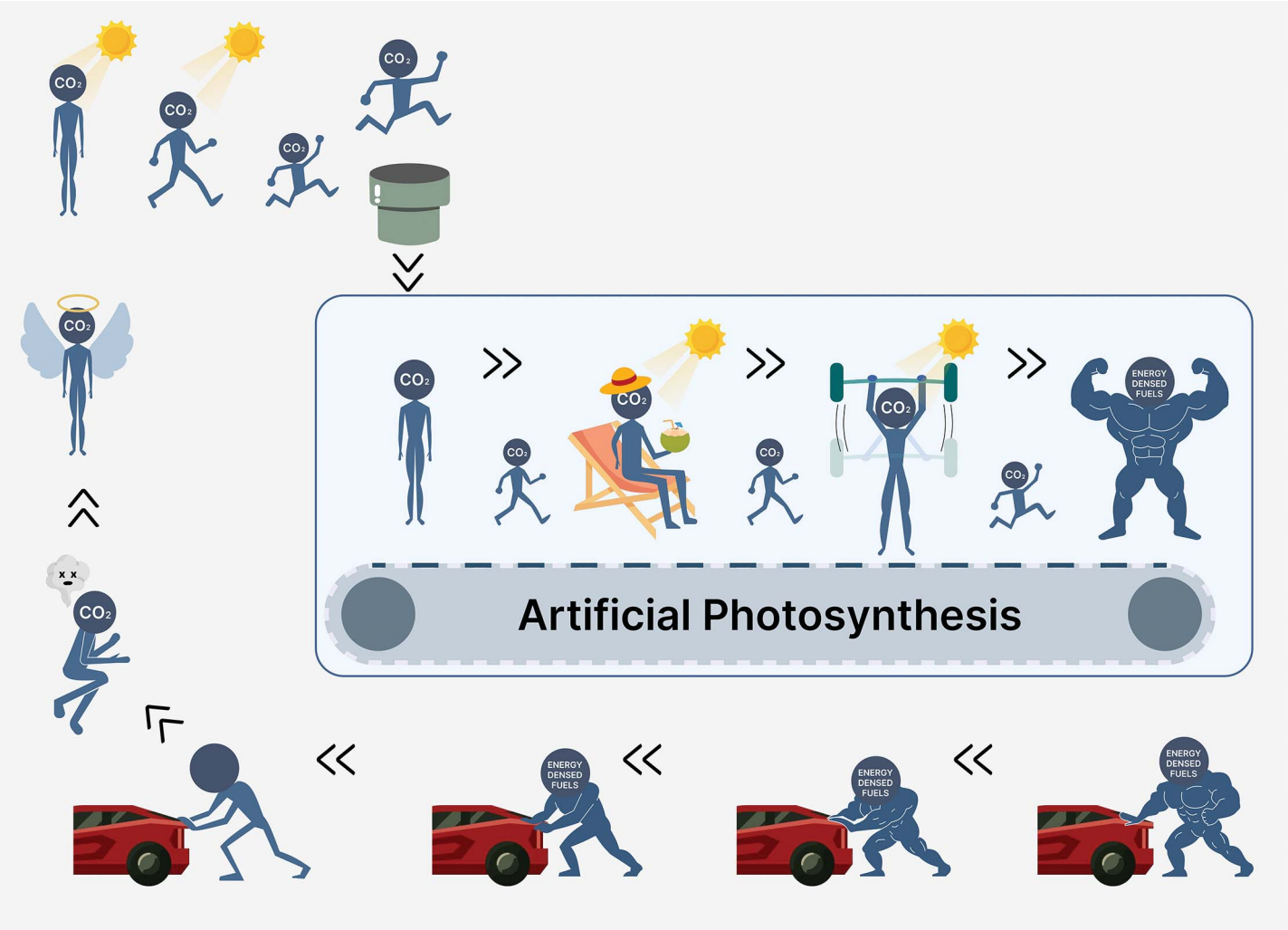

Showcasing research from Professor Wang's laboratory, Graduate School of Engineering, Nagoya University, Nagoya, Japan & Pornrungroj's laboratory, Faculty of Engineering, Chulalongkorn University, Bangkok, Thailand.

Artificial photosynthetic processes using carbon dioxide, water and sunlight: can they power a sustainable future?

This Perspective explores the promise and challenges of artificial photosynthesis, where sunlight, water, and carbon dioxide are converted into energy-rich fuels and chemicals. We assess the current status of solar-driven CO_2 conversion technologies, highlighting the techno-economic barriers of capture, separation and scale-up. By connecting laboratory progress with practical considerations, we propose opportunities that could bring these systems closer to real-world application. Our analysis aims to provide a clearer picture of the pathways toward sustainable solar fuel production in the future.

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