Discourse Series

Light illuminates innovation in medicine and climate solutions

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Metallic nanoparticles, used since antiquity to impart intense, vibrant color into materials, have more recently become a central tool in the nanoscale manipulation of light - we know them as the thin red lines in COVID tests. When illuminated by light, these metallic nanoparticles undergo coherent oscillations of their conduction electrons, responsible for their strong light-matter interactions and properties. The strong photothermal (the production of heat by light) properties that result from illumination, are unique properties of this family of nanoparticles that can be exploited in transformative applications. The photothermal properties of gold-based nanoparticles now provide the foundation for an ultralocalised cancer therapy that is successfully removing tumors within the prostate.

More recently we have begun to question whether the same, or similar properties can also be realised in more sustainable materials. Aluminum, the most abundant metal on our planet, can be synthesised, supporting high-quality plasmonic properties spanning the UV-to-IR region of the spectrum. Aluminum can also be used as an optical antenna, providing a new type of light-based catalyst that is being utilised for consuming greenhouse gases and rapidly advancing the Hydrogen economy.

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