Plasma made nanocarbons for energy applications

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This presentation presents focused recent examples of plasma made carbon based nanomaterials and their applications in energy conversion and storage, as well as water purification and desalination [1-4]. Plasma specific effects are introduced and discussed from the perspective to enhancing functional performance in the envisaged applications.

In the featured example of application of vertical graphenes for solar thermal conversion, light absorber and thermal insulator are seamlessly integrated to minimize heat loss and enhance mechanical robustness. Engineered water pathways allow efficient water supply and well-localized heat transfer.

Together with superior light absorption properties and substantially reduced interfacial heat transfer resistance, the all-carbon nanoarchitecture exhibits not only a high conversion efficiency but also a simultaneous record-high solar-thermal response rate.

High throughput, scalable fabrication of the unique nanoarchitectures is demonstrated, benefiting large-scale solar energy harvesting and related real-world applications. The features of the plasma made solar thermal energy conversion structure include but are not limited to [1]:

- Ultrafast, highly efficient solar thermal conversion and solar vapor generation
- All-carbon solar-vapor evaporator integrating light absorber and thermal insulator
- Uniquely engineered water pathways and enhanced interfacial thermal transport
- High-throughput, scalable fabrication for high-temperature sterilization

The devices and processes presented in [1-4] are low-temperature plasma enabled, scalable and offer diverse opportunities for applications in different industrials sectors.

References

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