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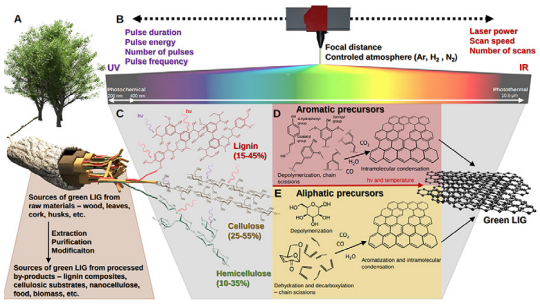
Green laser-induced graphene can be made from many organic polymers, could reduce waste and lower costs in many fields



Graphene has many useful properties that make it desirable for a wide range of applications in electronics and semiconductor manufacturing. The graphene production process, however, is complicated, involving multiple fabrication steps and, commonly, toxic or hazardous solvents. An alternative method is laser-induced graphene (LIG), which involves applying a laser to polymeric substances to create graphene directly.

The process to create LIG was initially conducted on a specific polymer, polyimide, but in recent years graphene has been created from many different polymers, including biopolymers such as lignin, cellulose, and even food. Creating graphene from common, natural materials could make it more sustainable and accessible while reducing waste.

Claro et al. examined many of these sustainable graphene precursors and how they can be used to produce green LIG. They identified several of the most promising materials, detailed how they can be converted into graphene, described their various properties, and outlined possible routes to wide-scale adoption.

“We hope to create a complete and important platform for the further development of recyclable and sustainable individual components or technological platforms with a very low environmental footprint,” said author Pedro Ivo Cunha Claro.

Because each precursor material will have its own chemical composition, thermal properties, morphology, and other characteristics, developing a manufacturing process can be challenging. However, this can also create opportunities to identify the most promising materials for specific applications. The authors hope their work will help others navigate this material landscape.

“The more knowledge is generated, the better researchers will understand the dynamics of this laser irradiation conversion, giving them tools to tackle these challenges,” said Claro.

Source: “Sustainable carbon sources for green laser-induced graphene: A perspective on fundamental principles, applications and challenges,” by Pedro I. C. Claro, Tomás Pinheiro, Sara L. Silvestre, Ana C. Marques, João Coelho, José M. Marconcini, Elvira M. C. Fortunato, Luiz H. C. Mattoso, and Rodrigo F. P. Martins, *Applied Physics Reviews* (2022). The article can be accessed at https://doi.org/10.1063/5.0100785.