
AI for Materials Science: Tuning Laser-Induced Graphene Production

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Abstract AI and machine learning have advanced the state of the art in many application domains. We present an application to materials science; in particular, we use surrogate models with Bayesian optimization for automated parameter tuning to optimize the fabrication of laser-induced graphene. This process allows to create thin conductive lines in thin layers of insulating material, enabling the development of next-generation nano-circuits. This is of interest for example for in-space manufacturing. We are able to achieve improvements of up to a factor of two compared to existing approaches in the literature and to what human experts are able to achieve, in a reproducible manner. Our implementation is based on the open-source mlr and mlrMBO frameworks and generalizes to other applications.
