From Atom to Product: Physical AI transforming Materials Industry

Jan Weinreich

¹Quastify Materials Inc., 469 Waverley Street, Menlo Park, California, United States

jan@quastify-materials.com

Title:

From Atom to Innovation: Physical AI Transforming Materials Discovery

Abstract:

In an era dominated by data-driven approaches, conventional AI models often fall short in capturing the intricate physics underlying material behavior. But materials and production step shapes our world in tangible ways, and to effectively shape the physical world, AI must understand it. Just as self-driving cars need to plan what lies ahead on the road, AI at the atomic scale must grasp the rules of chemistry.

At Quastify Materials, we integrate research from the quantum chemistry and machine learning communities over the past 20 years with physics-based artificial intelligence. The timing is right, as LeCun noted recently, "I am not interested anymore in LLMs. I am more interested in next-gen model architectures that can understand the physical world." Our platform harnesses guantum mechanical principles and advanced machine learning to create digital twins that accurately represent chemical processes from the atomic level to full-scale manufacturing. This approach compresses millions of compute hours into just one hour, reducing research and development cycles while lowering costs and energy consumption.

By embedding the fundamental laws of physics directly into the AI framework, we enable precise predictions of material properties, optimize production pipelines, and ensure economic viability.