

IM2D: an industry-driven interoperable solution for the simulation-aided design of emerging electronics

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Contribution: The current and major worldwide drive for big data, machine learning, and quantum computing will push away from traditional all-silicon platforms, and provide a clean slate for industry to rapidly deploy novel technologies based on innovative materials and devices. This requires fast exploration of materials' properties (e.g. memory effects for memristive computing), linking materials properties to performance in unexplored architectures, and assessing their business potential. Here, we present an interoperable material-to-device simulation platform, named IM2D, for characterization and design of synaptic electronics for neuromorphic computing. IM2D conjugates the advantages of material and device-driven software, connecting the properties of materials at the atomistic level to the electrical behavior of devices, with the aim to reduce the gap between materials and device realms and sustain the simulation-aided R&D processes of semiconductor industries and SMEs. IM2D is based on the integration of first-principles materials modelling approaches and modelling software for emerging devices, fully compliant with a vision of semantic interoperability, driven by standardized ontologies. We demonstrate the capability of the IM2D software, by investigating the switching mechanisms in amorphous chalcogenide materials, proposed for non-volatile memory devices and selectors.

A beta version of IM2D is now available on request for early adopters. If interested contact us at intersect@nano.cnr.it or subscribe to our newsletter. See <https://intersect-project.eu> for further details and news.

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