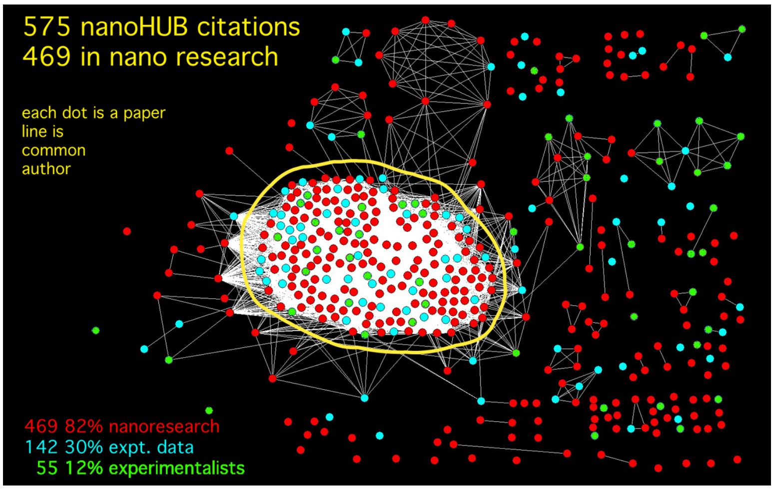
nanoHUB: Use by Experimentalists

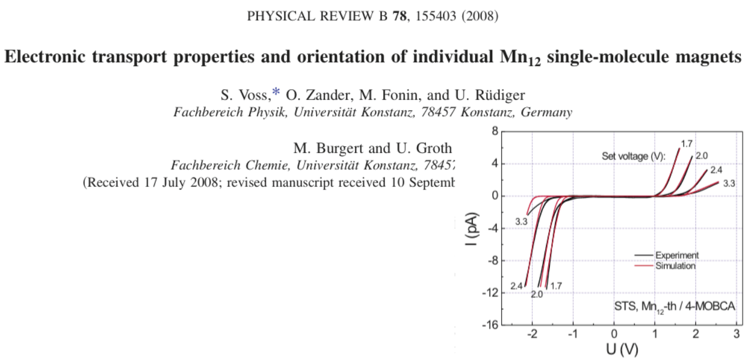
nanoHUB Social Network Map of Experimental Papers



Documenting the impact achieved by researchers who are using a remote cyberinfrastructure is a challenging task and part of our assessment effort. This year we have re- examined all 575 nanoHUB citations in the literature to find out if the citation is either given by experimental group that has clearly designed or improved an experiment and utilized nanoHUB resources along the way, or, which is a bit easier to identify, if the paper is plotting real experimental data. In the cosmos of 469 citations that reference nanoHUB usage in nano research, we have identified 55 (12%) papers that are clearly driven by experimentalists, and 142 (30.3%) papers that plot experimental data. We consider these numbers to be a strong evidence of extensive use of nanoHUB by experimentalists doing experimental nanotechnology.

Example – MolCtoy

We have also determined that 41 of the papers are written by authors with industrial affiliations. This is just about 9% of the 469 nano research papers. As a concrete example we reference an experimental Phys. Rev. B paper where the authors use the conceptual model of molecular conduction in the tool MolCtoy by Supriyo Datta to explain fundamental conduction results.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Electronic transport properties and orientation of individual Mn_{12} single-molecule magnets

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The authors state in the abstract: “A fewparameter scalar model for ballistic current flow through a single energy level is sufficient to describe the main features observed in scanning tunneling spectra of individual Mn12 molecules and offers a deeper insight into the electronic transport properties of this class of single-molecule magnets.” The authors plot their data and MolCtoy results in their paper on the same chart as shown in the figure here. The authors logged into nanoHUB some 65 times and ran around 280 simulations with MolCtoy consuming less than 20 minutes of CPU time. This paper was published in Oct. 2008 and already has been cited three times.

Example – FETtoy

As another example we list the use by Judy Hoyt’s MIT research group of nanoHUB FETtoy tool to examine their experimental Si/Ge slabs. The work is published in IEEE transactions electron devices. Prof. Hoyt, who is a very well respected experimentalist in the nanoelectronic community and a Fellow of the IEEE, is planning to attend the NCN site visit virtually through a teleconference link to describe her nanoHUB interactions.

Example – OMEN-FET

A newly developed nanoHUB tool models electron transport in high mobility InAs/InGaAs based transistors. The particularly important modeling capability is the mapping of the non-parabolic bandstructure to a simplified model and the ability to compute the gate tunneling. The visualization of the current flow drove a nanoHUB development that now enables an intuitive representation of gate tunneling. The new OMENfet code has now been released and is now available openly on the nanoHUB. The scientific results generated in this experimental and theoretical collaboration has been published in a co-authored IEDM proceedings article involving the experimental MIT group of Jesus del Alamo and the theory group of Klimeck at Purdue. The funding for the science was obtained through leveraged grants of the FCRP / MSD center where del Alamo and Klimeck participate.