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When 'doping' is the smartest thing

Judy Siegel-Itzkovich , THE JERUSALEM POST Aug. 18, 2007

Things can often be improved by a little "contamination." Steel, for example, is iron with a bit of carbon mixed in. To produce materials for modern electronics, small amounts of impurities are introduced into silicon - a process called doping. It is these impurities that enable electricity to flow through the semiconductor.

Scientists at the Weizmann Institute in Rehovot, together with colleagues from the US, recently became the first to use doping in the development of electronic components made of single layers of organic (carbon-based) molecules. Such components can be inexpensive, biodegradable, versatile and easy to manipulate. The main problem, however, is that the organic materials must first be made sufficiently pure and then ways must be found to successfully dope these delicate systems.

This is what Prof. David Cahen and postdoctoral fellow Dr. Oliver Seitz of the Rehovot institute's material and interfaces department, together with Drs. Ayelet Vilan and Hagai Cohen from the chemical research support unit and Prof. Antoine Kahn from Princeton University did. After they succeeded in purifying the molecular layer to such an extent that the remaining impurities didn't affect the system's electrical behavior, they showed that such "contamination" is indeed possible. The scientists doped the "clean" monolayers by irradiating the surface with UV light or weak electron beams, changing chemical bonds between the carbon atoms that make up the molecular layer. These bonds ultimately influenced electronic transport through the molecules.

This achievement was described in the *Journal of the American Chemical Society* .The researchers believe this method could enable scientists and electronics engineers to substantially broaden the use of organic monolayers in the field of nanoelectronics. Dr.Seitz comments: "If I'm permitted to dream a little, it could be that this method will allow us to create types of electronics that are different and maybe even more environmentally friendly than the standard ones that are available today."

THECOLOROFTRUSTWORTHINESS

Wikipedia, the free online encyclopedia, (www.wikipedia.com), is great when you urgently need information on a subject you don't have a clue about. But you can't always trust its information, as it's written by amateurs, and some vested interests may intentionally spread falsehoods. Now, a program developed at the University of California, Santa Cruz, aims to help by color-coding an entry's individual phrases based on contributors' past performance.

The program analyzes Wikipedia's entire editing history - nearly two million pages and 40 million edits for the English-language site alone - to estimate the trustworthiness of each page. It then shades the text in deepening hues of orange to signal dubious content. A 1,000-page demonstration version is already available on a web page operated by the program's creator, Luca de Alfaro, associate professor of computer engineering at UCSC (see http://trust.cse.ucsc.edu).

Other sites employ user ratings, but these typically depend on users' feedback about each other, making the ratings vulnerable to grudges. The new program takes a

radically different approach, using the longevity of the content itself to learn which contributors are the most reliable.

"The idea is very simple," de Alfaro says. "If your contribution lasts, you gain reputation. If your contribution is reverted [to the previous version], your reputation falls." The program works from a user's history of edits to calculate his or her reputation score. The trustworthiness of newly inserted text is computed as a function of the reputation of its author. As subsequent contributors vet the text, their own reputations contribute to the text's trustworthiness score. So an entry created by an unknown author can quickly gain - or lose - trust after a few known users have reviewed the pages.

A benefit of calculating author reputation in this way is that de Alfaro can test how well his reliability scores work. He does so by comparing users' reliability scores with how long their subsequent edits last. So far, the program flags as suspect more than 80 percent of edits that turn out to be poor. The exhaustive analysis of Wikipedia's seven-year edit history takes de Alfaro's desktop PC about a week to complete. At present he's working from copies of the site that Wikipedia distributes. Once the initial backlog of edits is calculated, however, de Alfaro said updating reliability scores in real time should be fairly simple. While the program prominently displays text trustworthiness, de Alfaro favors keeping the reputation ratings of individual users hidden. Displaying reputations could lead to competitiveness that would detract from Wikipedia's collaborative culture, he said, and could demoralize knowledgeable contributors whose scores remain low simply because they post infrequently. "We didn't want to modify the experience of a user going into Wikipedia," de Alfaro insists. "It is very relaxing right now, and we didn't want to modify what has worked so well."

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[Back to the Article]

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