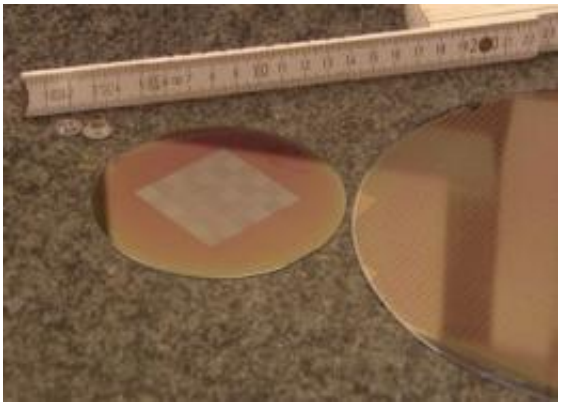
Specialized invisible needles make us see surfaces at the nanoscale

April 19 2011, by Annette Ostrand



We expect our electronic devices, such as mobile phones and computers, to work properly and become even better with time and seldom think about the amazing innovations making this possible. Scientists are developing a cantilever array that can have an important impact on synthesis and analysis of nanostructures that can improve the quality control of mobile phone camera lenses.

A cantilever is a very thin single needle currently used for quality control at the nanoscale, but to improve and speed up the process scientists are developing an array of needles, a cantilever array, functioning simultaneously. Except for finding defects on mircochips this array could benefit the optical industry by improving the quality control of

mobile phone camera lenses.

Researchers use Scanning Proximity Probes (SPP) to analyze the quality of electronic devices by scanning their components' surfaces at the atomic level. Presently, single probes are used and the scanning rate is very slow. Each probe, a cantilever consisting of a specialized silicon needle only a few microns wide which is invisible to the naked eye, vibrates when passing over a surface.These vibrations are transformed into electric signals and then interpreted by a computer that creates a three-dimensional scan. In this way the researchers can see how a certain surface looks in detail. Without these kinds of sensitive nanotools it would be impossible to see if all nanosized components were in the right place and the quality would therefore be poorer.The limitation to the scanning area's size and the scanning speed has been the SPP nanotools' mechanical resonance frequencies.

To increase the scanning speed and analyze larger surfaces researchers from Germany, Poland, Sweden, the UK, Slovakia, Bulgaria, Switzerland and France have joined forces in the European Commission funded project PRONANO - Proceedings of the Integrated Project on Massively Parallel Intelligent Cantilever Probe Platforms for Nanoscale Analysis and Synthesis. They are developing a cantilever array for parallel operation that can have an important impact on synthesis and analysis of nanostructures.

Cantilevers are not only used for surface analysis but for nanolithography, critical dimensions control and data storage. The PRONANO cantilever array could also benefit areas such as the optical industry, where it has shown to be able to point out defects in certain types of lenses ten times faster than the technology used today, which could increase output from this industry.

When this cantilever array reaches the market it can improve

performance and lower the price of computers and mobile phones, as well as improve quality control of lenses for cameras in mobile phones. In addition, when defective products are found and discarded earlier in the production process, it could mean this new cantilever array becomes a much more environmentally friendly alternative. However, this is dependent on for example the production procedure of the cantilever array.

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