

Separation of DNA and proteins through improved gel electrophoresis

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Medical diagnoses and DNA sequencing can be made cheaper, faster and more reliable using a new miniaturized technique for gel electrophoresis based on conducting polymer materials, according to researchers at Linköping University in Sweden.

Gel electrophoresis is a process through which different proteins or DNA fragments are separated so that they can be identified and studied. Today, most separations require considerable manual work and are carried-out on large gels which require several hours to complete. The industry needs miniaturized systems capable of automatically performing a large number of separations simultaneously, and much more quickly.

PhD students Katarina Bengtsson and Sara Nilsson from the Transport and Separations Group at Linköping University have demonstrated a significant step toward miniaturized [gel electrophoresis](#). Their finding – recently published in the scientific journal *PLoS ONE* – was achieved by developing [conducting polymer](#) materials to replace platinum electrodes that are traditionally used in gel electrophoresis systems. This advance allows the stationary metal electrodes fixed in electrophoresis equipment to be replaced. The plastic electrodes can then be included as part of a disposable cassette containing the separation gel. This eliminates cross-contamination between gels run in sequence. Other issues in electrophoresis are bubble formation and pH-changes caused by water electrolysis. PhD student Per Erlandsson has previously shown that the conducting [polymer materials](#) are able to be oxidized and reduced

themselves, thereby eliminating the need to electrolyze water in electrokinetic systems.

"One of our strategies is to find ways to use these materials, developed for the printed electronics industry, in applications other than electronics and optoelectronics. We hope that this result will accelerate the automation and miniaturization of gel electrophoresis, which in turn can make medical diagnoses and DNA sequencing cheaper, faster, and more reliable," says Assoc. Prof. Nathaniel Robinson, leader of the research group, on their "work as a logical extension of previous studies on conducting polymer electrodes in electrokinetic systems."

The technology will be further developed by the university start-up company LunaMicro AB.

More information: Conducting Polymer Electrodes for Gel Electrophoresis av Katarina Bengtsson, Sara Nilsson och Nathaniel D. Robinson. *PLoS ONE* open access February 2014.
[dx.doi.org/10.1371/journal.pone.0089416](https://doi.org/10.1371/journal.pone.0089416)

Provided by Linköping University

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