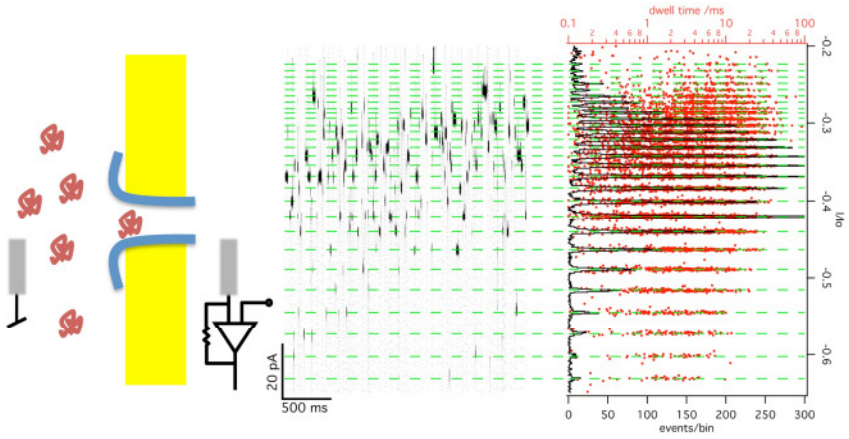
Team from Germany and France find new biological pore for polymer sizing

Freiburg & Cergy, 10th of June 2015

In pioneering work carried out a decade ago in a collaboration between Oleg Krasilnikov and John J. Kasianowicz and coworkers, sizing of non-ionic synthetic polymers has been described as one of the most promising applications, besides DNA-sequencing, of ionic sensing with biological nanopores. In fact, only one type of nanopore and only one type of polymer has been used to demonstrate this principle, also called nanopore-based single molecule mass spectrometry (Np-SMMS): alpha-hemolysin, a heptameric beta.-barrel toxin from staph. aureus was used to establish the size distribution of polydisperse mixtures of poly(ethyleneglycol) (PEG).



Now, a team of researchers from Freiburg, Germany and Cergy, France, just published a paper in ACS Nano with the surprising finding that another pore-forming toxin, aerolysin from Aeromonas hydrophyla is much better suited than alpha-hemolysin to that purpose. The reason for the superior performance is the fact that over a potential range of 0 to 120 mV the dwell times of polymer-pore interaction in aerolysin show a strong increase with the strength of the electric field applied to drive the pore current and show a maximum at -120 mV (stem-side), with dwell times that are significantly longer than those found at the optimal potential for alpha-hemolysin (+40 mV).

The work was carried out using the Orbit-16 automated bilayer device from Nanion Technologies GmbH running Ionera's MECA nanopore array chips. Abdelghani Oukhaled, project leader for the French part of the team and one of the paper's senior authors says: "Halfway through the collaboration on this paper, we took delivery of our own Orbit. If you have been fighting with bilayers for years, the ease of making a whole array of them and doing high-end recordings from them is a whole new world."

Gerhard Baaken who is first author and Ionera's CEO adds: "It's a great experience to do interesting science and convince a future customer at the same time."

The groups will continue to collaborate on the protein pore. Jan Behrends of the Department of Physiology at Freiburg University and another senior author says:"Aerolysin seems a very promising candidate not only for sensing synthetic polymers. In general, testing the interactions of various pores with various analytes seems a logical way forward to understand just what makes that

interaction so sensitive to molecular size. It's a long road, but the throughput of the Orbit /MECA combination will help us to reach that goal."

Download the full publication here: http://pubs.acs.org/doi/abs/10.1021/acsnano.5b02096

About Nanion Technologies

Nanion Technologies was founded in 2002 as a spin-off from the University of Munich, Center for Nanoscience (CeNS). Over the last 13 years it has grown to a strong company with over 80 employees worldwide. Nanion has its headquarters in Munich, Germany, and has daughter companies in the USA and China, with distribution partners in 7 other countries, including Japan. Nanion has been recognized for its quality and innovation by being twice nominated for the Federal President's Award for Technology and Innovation (Deutscher Zukunftspreis) in 2007 and 2014. The company has become known for its high quality instruments for ion channel research (Port-a-Patch, Patchliner and SyncroPatch product families) and has over the years expanded its product range to include cardiotoxicity screening (CardioExcyte 96), parallel bilayer recordings (Orbit 16), and parallel membrane transporter protein recordings (SURFE2R). Since 2014, Nanion carries Axion's multi-electrode array (MEA) systems in Europe and China.

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About Ionera Technologies

Ionera Technologies GmbH is a spin off from the University of Freiburg and was founded beginning of 2014. Ionera is a young startup company in the field of biophysical nanotechnology and develops and produces Micro Electrode Cavity Arrays (MECA) to allow automated and highly parallel recordings from lipid bilayers. The applications of this generic technology include electrophysiological studies of membrane protein properties as well as nanopore analysis e.g. polymer sizing with nanopores. Ionera is based in Freiburg, Germany.

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