Rapid cancer detection supported by GEMStar ALD

April 5, 2022

ALD is a versatile method of depositing thin films and is finding applications beyond the most common semiconductor uses. Nitza Burck et al. in the group of Amit Meller at Technion-IIT in Israel used Arradiance's GEMStar ALD system to deposit a 15 nm TiO_2 film for a novel application: rapid DNA characterization for cancer detection. DNA strands were passed through nanopores in TiO_2 to measure their length, allowing different strands to be distinguished.

How do you detect a cancer mutation in a sample of human DNA? If this can be done, very sensitive cancer tests can be developed which find cancer in its earliest stages. The Meller collaboration applied a process which cut only the unmutated DNA at the possible mutation site, leaving them shorter than the DNA strands containing the cancer mutation.

To detect the now longer cancer DNA, the ALD TiO_2 film with a 2 nm hole was placed in a solution containing the DNA with electrodes on either side. Applying a voltage across the electrodes causes the charged DNA molecules to pass through the hole in an established electrical method. While a DNA molecule is passing through the hole, it decreases the electrical current. The longer cancer DNA strands block the current for more time, allowing them to be distinguished from the healthy DNA so the cancer can be detected.

Read the full Journal of Clinical Chemistry article here (note that the ALD and other nanopore fabrication details are in the supplemental information), or contact us if you would like to inquire about a GEMStar ALD system or foundry ALD film deposition services. The GEMStar's hot-wall chamber, heated multiprecursor manifolds, and high conductance vacuum lines enable fast, clean deposition even when using precursors such as TDMAT which this study used.

Please Contact Arradiance for more information