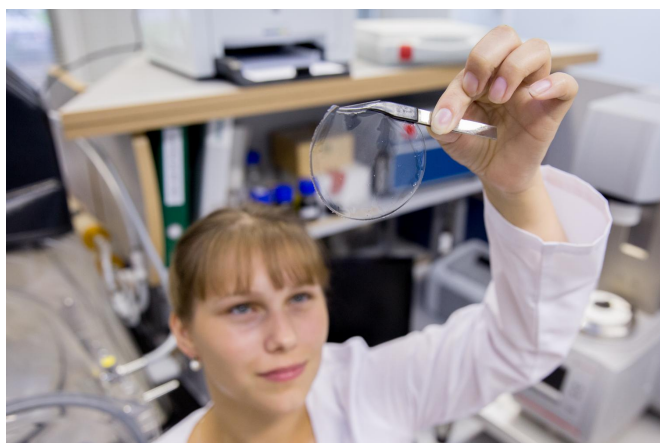


Scientists work out method to create unique polymeric membranes with carbon nanotubes

20 October 2016



Credit: National Research Nuclear University

In recent years, a large number of fundamental and applied studies have been dedicated to the properties of polymeric materials. In interactions with nanoparticles, the structures of polymers are transformed, which leads to a significant change of the physical properties of these materials; for example, the parameters of molecule diffusion changes. Such materials are considered promising for the modernization of membrane technologies for separation of gas and liquids.

Researchers at the National Research Nuclear University MEPhI (Russia) together with their colleagues from A.V. Topchiev Institute of Petrochemical Synthesis (Russia) have developed methods of polymer modification via the incorporation of carbon nanotubes. "We managed to define conditions of forming and necessary parameters of structure from carbon nanotubes in a polymer, which guarantees significant enlargement of membrane permeability to certain gases and liquids. The program package,

developed in MEPhI, conducts modelling and calculates geometry features of membranes and clusters from nanotubes in any type of polymers. Using complex equipment, we obtained and researched samples of so-called percolation membranes, the transport properties of which are a lot better than of existing polymers," said MEPhI Associate Professor A.M.Grekhov.

After adding 1 percent of CNT masses into poly (vinyl trimethylsilane), the permeability of such materials increased five times for nitrogen, twice for oxygen, four times for methane and 15 times for propane. Such material has many applications, including natural-gas stripping, CO₂ expulsion from the air, and nanofiltration of organic mixtures. Currently, the method of hybrid membrane synthesis is being considered for different polymers.



Solutions of carbon nanotubes and "percolation" membranes samples. Credit: National Research Nuclear University

More information: AVBalakireva@mephi.ru

Provided by National Research Nuclear University

APA citation: Scientists work out method to create unique polymeric membranes with carbon nanotubes (2016, October 20) retrieved 27 October 2021 from <https://phys.org/news/2016-10-scientists-method-unique-polymeric-membranes.html>

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