

09/18/2024

New materials developed by Technion researchers will help in the early diagnosis of various diseases and in reducing the need for high radiation tests

New materials developed at the Shulich Faculty of Chemistry will help in the early diagnosis of various diseases and in reducing the need for high-radiation tests. These materials are expected to lead to a significant improvement in the quality of MRI scans and to expand their use. The aforementioned materials and the results of their use are presented in the article by Prof. Aharon Blank and Dr. Itai Katz, published in *Science Advances*. In the study, which was supported by the Human Health Initiative at the Technion (THHI) (and the European Research Commission (ERC), Prof. Boaz Pokroy and Dr. Arad Lang from the Faculty of Materials Science and Engineering at the Technion, who were involved in the preparation of some of the unique materials inspired by nature, participated, and Prof. Beno Mayer from the Institute Karlsruhe of Technology.



Prof. **Aharon Blank** (left) and Dr. **Itai Katz**

MRI is a non-invasive, radiation-free imaging technology used in the diagnosis of various clinical conditions. One of the limitations of conventional MRI devices is that they have difficulty locating substances involved in metabolism (metabolites) because their density in tissues is very low. Many of the metabolites are used as clinical markers indicating various disease states including malignant tumors, abnormal cell division, cell death and cellular stress. This is the motivation of many research groups trying to find a solution that will allow the identification of metabolites in imaging scans.



Prof. **Boaz Pokroy**



Dr. **Arad Lang**

Technion and Karlsruhe Institute of Technology researchers present in their article a new method that enables the identification of metabolites in MRI .The method, called MMV ,is based on new metabolites that are characterized by two significant advantages in this context: a dramatic amplification (by about four orders of magnitude) of the magnetic resonance signal and preservation of the signal strength for a long time compared to existing metabolites - about ten minutes compared to one minute. The practical significance of the findings is that the new materials will make it possible to track the metabolites in the different tissues, and over time. Furthermore, thanks to the new qualities that these materials give to MRI tests , such tests could in some cases replace expensive and radiation-intensive tests such as PET-CT .



One of the steps in the process of preparing the unique materials. This step involves a high-voltage plasma breakdown that passes through the grains of the material

According to Prof. Blank, "Our discovery is very exciting for us, as the new method will provide the testing team with a wider window of time to perform the scan, and we estimate that it will expand the use of MRI scans that do not involve radiation. These materials will improve the abilities of medical and research teams in the early diagnosis of diseases, in the characterization of the tissue, in monitoring the development of the disease, in planning surgeries, in choosing optimal treatment and in making informed decisions".

For the article in Science Advances [click her](#)