## COLD PRODUCTION BY ADSORPTION

As part of the University's initiatives of 'Jan Dlugosz University for the Earth', within the scientific research carried out by the academics of the Faculty of Science & Technology of JDU, professor Jarosław Krzywański from the Department of Advanced Computing Methods is currently working on the project: '*The production of cold by adsorption*'.

Project description:

The need to save energy resources and protect the environment are key problems the civilisation of the 21st century faces. An important part of electricity consumption is cooling, and forecasts predict that its share of overall energy consumption will continue to increase in the coming years. Currently, a compressor cooling system is most commonly used for cooling. An important disadvantage of this type of refrigerator is the use of refrigerants which are responsible for destroying the ozone layer. The negative impact on the environment of conventional refrigerating units leads to research into the development of alternative technologies in this regard. The academics of the Department of Advanced Computing Methods are currently conducting research related to the development of organic, adsorption technology for the production of cold. The main advantage of adsorption aggregates is the use of heat as the drive energy of the refrigeration circuit. The share of electricity is marginal and focused on controlling and powering circulating pumps in these technologies. Low-temperature sources of solar energy, heat produced in cogeneration or industrial waste heat which is a by-product of many technological processes can be used to power adsorption refrigerators. Thus, the dissemination of adsorption technology has a positive impact on increasing the share of RES in overall electricity consumption. This is of particular importance in Poland, where electricity is mainly produced from fossil fuels. In addition, sorption units generate low operating and repair costs, and the operation of these devices takes place at a slight noise level and is devoid of vibration. The cooling power in the adsorption cooling cycle is obtained by the use of heat effects, which are a consequence of cyclically carried out processes of adsorption and desorption in a fixed deposit of porous material. The research in the Department of Advanced Computing Methods focuses on improving the cooling efficiency of adsorption aggregates by designing new higher efficiency adsorption designs and optimising the refrigeration cycle. For this purpose, the CFD numerical modeling, AI algorithms and unique experimental stations are utilised to validate the developed models.