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Research on the characteristics of the wind turbine

The paper concerns the topic of using wind turbines to produce electricity. Main attention was focused on showing the method of researching the basic characteristics of the model wind turbine: power characteristic as a power of the device to the wind speed ratio and power characteristic as a power of the device to the inclination of blade angle ratio. In addition, some dependencies have been defined: dependence of rotational speed of the wind turbine on a speed of flowing air, and dependence of rotational speed of the wind turbine on an inclination of the blade angle. The measurements required for this purpose were carried out in an aerodynamic tunnel at the Laboratory of Renewable Energy Sources of the Białystok University of Technology.

Aleksandra GOŁONKO, Marzena MATEJCZYK

Two faces of selenium. Selected aspects of selenium biological activity

Studies of recent years indicate the very valuable properties of selenium in medical field. The interest in selenium has increased since we learned the methods of its determination in biological samples and its role in living organisms. Selenium, depending on the concentration, has antioxidant and prooxidative properties. In addition, in animal studies and human and animal cell lines, it exhibits anti-cancer properties. In the era of increased incidence of human and animal cancer, selenium is very popular among scientists around the world due to its high biological activity. Current research results highlight the various effects of selenium molecular activity. One of the main mechanisms of action of this element is active participation in the protection of cells against the effects of oxidative stress. The review presents the general properties of selenium, its biological activity and the current state of knowledge about its potential anticancer activity. Also, known molecular mechanisms of selenium activity in a living cell are mentioned.

Katarzyna MISIOŁEK

Role of urease active bacteria in the processes of soil biocementation

The aim of the paper is to present and describe the use of microbially induced calcite precipitation process (MICP). The basis of MICP process is bacterial metabolic activity which thereby promotes the precipitation of calcium carbonate in the form of calcite. Ureolytic bacteria that hydrolyze urea, proved to be the most effective to perform precipitation of calcium carbonate. Therefore their application seems to be beneficial in the processes biocementation of soils. The paper presents the methods of obtaining the urease active bacteria and describes laboratory methods in order to achieve the best strength parameters of tested soil.

Jakub SIEMIENUK, Ewa SZATYŁOWICZ

Reducing CO₂ emissions in the process of cement production

Emissions of carbon dioxide (CO₂) from fossil fuels and industry account for around 90% of all CO₂ emissions from human activities. Over the last three years, global CO₂ emissions have remained stable despite steady growth in the global economy. In 2017, forecasts show an increase in emissions by 2.0% from the level of 2016, reaching a record level of 36.8 ± 2 Gt CO₂ emissions. Further economic simulations are likely to further increase emissions in 2018 (Jackson et al 2017). Considering the fact that over 5% of global CO₂ emissions are emissions from the cement industry, the aim of the work was to determine the fuel and ecological benefits resulting from the use of alternative fuels in the cement industry. The article discusses the properties of selected alternative fuels used in cement kilns as a source of heat in co-firing with coal. The use of combustible waste fractions as alternative fuels causes a reduction in their quantity in landfills, which in turn results in a reduction of CO₂ emissions, as waste incineration in cement plants does not increase the amount of CO₂ emitted.

Aleksandra ŚLIWIŃSKA

Solutions to decrease the noise emitted by air transport to environment

The air transport as well as the service provided at airports is responsible for noise emission to the local environment, which hinders the functioning and living, of both, people and animals. The paper shows the potential solutions aimed at reducing the emission of high sounds to the environment, which are primarily caused by aircraft, as well as the activities and functioning of airports. The conducted research has shown that there are numerous solutions which may lead to decrease of the noise emission. Just the introduction and use of new technologies, as well as technological solutions have an impact on the reduction of noise, both in an active and passive way. Undoubtedly both have an impact on its reduction and entails a reduction of its negative impact on the local environment. The aim of this study was to characterize the methods, the solutions which can be use either at airports, or in their surroundings or in aircraft's construction, which allows to reduce the noise emission to the local environment by air transport. The article is a response to the research problem, which was.

Dariusz TOMASZEWICZ, Jerzy OBOLEWICZ

Reinforcement diagnostic test of concrete samples in the context to the safe exploitation prefabricated building objects

The paper presents one of the diagnostics systems for building objects by means of profometers. Three-layer samples were made to reproduce three-layer external walls in large-panel buildings. Next three-layer samples and a long window sill in the construction wall of a large-panel building were tested. The thickness of the cover, the diameter of the hanger bars and the degree of corrosion of the reinforcement were assessed. The application of research results in practice will allow further safe exploitation of large-panel construction works.