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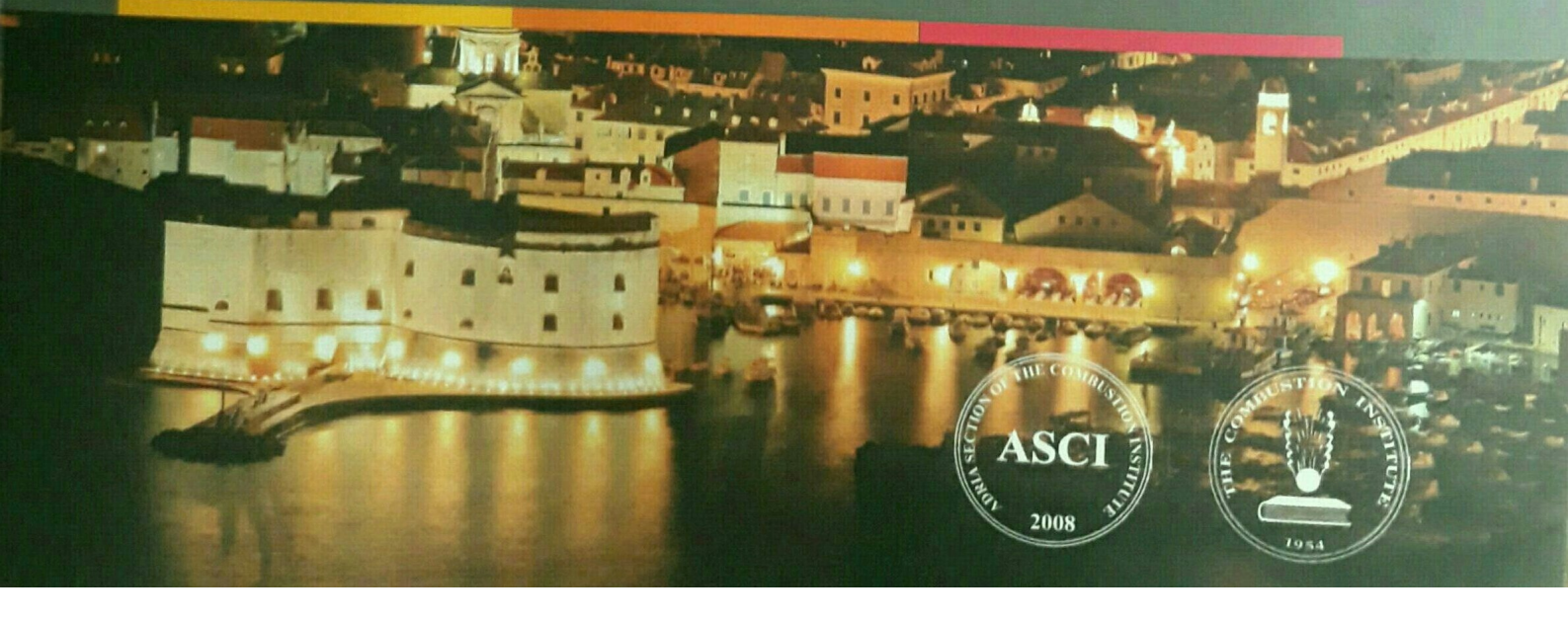

Edited by

Marko Ban, Milan Vujanović, Neven Duić, Hrvoje Mikulčić and Jakov Baleta

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April 18-21, 2017, Dubrovnik, Croatia

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PS1-06-09

ECM2017.0360 Synthesis of Hydrophobic Soot by Burning of Plastic Waste and Waste of Oils

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We have developed and constructed burner device for combustion of waste oil in view of the physical condition, properties of combustion fuel. The raw materials used waste oil from service stations car to replace oil. The results showed that the surface of soot obtained by burning waste oil has a hydrophobic property of the with wetting angle of 145-150 °C. The experimental research on the production of soot by burning waste oils showed that the burning of oil 30 g, depending on the combustion conditions can be obtained from 0.2 to 0.5 grams of soot. Despite the popularity and utility of business of processing plastic waste, currently processed only about 3%. And while recycled polyethylene stay as polyethylene, which, after a certain period of use are converted back into non-degradable garbage. In reality, in the combustion of polyethylene in composition of exhaust gases may be present: benzopyrene, carbon monoxide, various volatiles fireproof residue remains as ash or soot, which contain carcinogenic hydrocarbons. To minimize carcinogens in soot, we need to burn no plastic waste, gaseous decomposition products formed during heating without oxygen. In this work we developed installation for the synthesis of hydrophobic soot in combustion of products of decomposition of plastic waste. To identify the structural characteristics of the resulting soot, it was investigated by physical and chemical methods as Scanning electron microscope, Raman spectroscopy and to determine contact angle was used sessile drop method. Studies show that soot consists of soot accumulation rounded soot diameter of 30 to 60 nm in a bonded chain structure. Thus soot particles have a developed surface, which gives them superhydrophobic properties with a contact angle of more than 160^0.

PS1-06-10

ECM2017.0361 Controllable Method of Synthesis of Nanomaterials in Flame

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Obtaining of carbon materials in the process of combustion of hydrocarbons remain one of the widely used methods which used in large scale production. However, despite numerous studies, issues have not yet resolved which related to kinetics and mechanisms of formation of the products of combustion processes in flames, which limits assortment of the production of carbon materials with given properties by the combustion of hydrocarbons. Currently, research related to the formation and growth of the products of combustion in flames showed that their formation occurs not instantaneously, but through the sequence of reactions between the short lived intermediates generated particles (radicals, ions, molecules, debris, etc.). Reactions between intermediate active particles leads to the formation of the precursor, while it is "precursor" and defines the process of formation, structure and properties of the final stabilized product. The composition and structure of nucleus occuring in the flame, depends on a concentration density and nature of intermediate particles, which are individual for each fuel type, and due to its chemical composition. In this paper we conducted research to create a method which allows manage the process of formation of products of combustion in the flame, by selecting fuels and changes in the combined reaction zone of coaxial flame, concentration density and composition of the intermediate particles. The authors have developed a coaxial burner, which design allows you to create an environment when the initial combustion stage propagation individually for each fuel, with the further interaction of the intermediate products of combustion in the combined area of the flames. The organization of such combustion process will provide an opportunity to manage the processes of formation of the final products of combustion in flames. Explained by the fact that to change the sequence of chemical reactions which lead to the formation of stabilized the final products in individual flame areas can be achieved by injection into a given region of the flame of additional chemical compounds (atoms, ions, radicals, it.d. fragments of molecules). Based on the foregoing, in the present study we investigated the processes related to the formation of fullerenes, metal oxide nanoparticles and graphene at mixed coaxial burning of ethanol and propane-butane mixture.

PS1-07-04

ECM2017.0347 Synthesis of Carbonaceous Materials by High-Temperature Pyrolysis of Vegetable Feedstock for Adsorbents of Solar Collectors

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One of the new directions in the field of new materials for absorbing coating of solar collectors is carbonaceous materials based on plant materials with different additions. The carbon material based on vegetable raw materials prepared from low temperature pyrolysis 700-800 ° C temperature under an inert atmosphere for 3 hours. As a source of plant material used rice husk (RSH) and apricot pits (AK). As absorbers are also used carbonaceous a combined material consisting of carbonized apricot pits or rice husks and carbon nanotubes (CNTs). Carbon nanotubes were produced by pyrolysis of propane on a catalyst substrate 700 - 800 ° C temperature for 40 minutes in an inert atmosphere. For synthesis of stretching carbon nanotubes forests used pyrolysis of acetylene in an inert environment at a temperature of 730-750 ° C for 7-10 minutes with the addition of hydrogen. Synthesis of forest of CNTs was carried out on silicon catalyst substrates previously prepared by special way. Special preparation of silicon wafers was carried out by vacuum deposition of iron layer with thickness of 3 nm. Also, as the coating material pilot prototype of solar collectors used amorphous soot obtained during the incomplete combustion of propane / butane mixture. The resulting samples were examined for Raman spectroscope (NTEGRA Spectra Raman, $\lambda = 473$ nm, the signal area with a diameter of 80 nm) and by transmission electron microscope (JEM 1011). The obtained carbon materials investigated for the absorption capacity of the solar energy. It was established that most solar energy absorption capacity possesses in a coating by carbonized rice husk surface. Conducted a comparative experiments of the absorptive capacity of solar energy of the designed prototypes of solar collectors under actual conditions. Established that the coating of carbonized rice husk has a higher efficiency of absorption of solar energy compared with industrial coatings.