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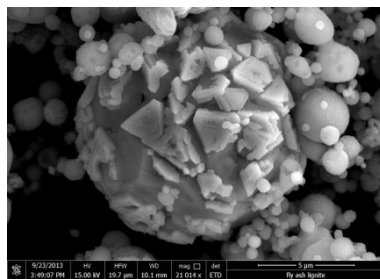
Centre of Excellence Telc



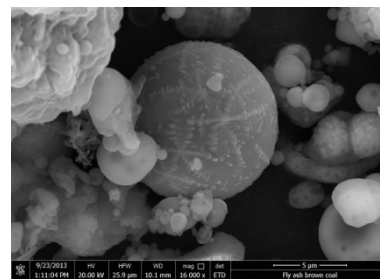
Material analysis of energy by-products

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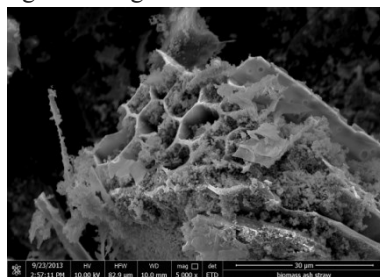
Within the laboratory analyzes were tested six kinds of by-products as derived from the combustion of fossil fuels, such as biomass. The aim of the testing was to determine and verify material properties for use in other industrial sectors. In the laboratories of the Center Excellence Telč were made following analysis: XRD diffraction, thermal analysis, IECdetermination of cations and anions, Raman spectroscopy, infrared spectroscopy, FTIR and microscopic analysis using an electron microscope SEM / EDS. Accredited laboratory Research Institute for brown coal Inc. carried out a chemical analysis of the ashes and identify mechanical properties of the samples. Samples were collected in cooperation with a student VŠB-TU Ostrava. Samples were analyzed for ash from the combustion of lignite and brown coal produced power plant in Mělník, bottom ash from power plant Hodonín and ash from incineration of phytomass - hay and straw - the energy center Jindřichův Hradec.



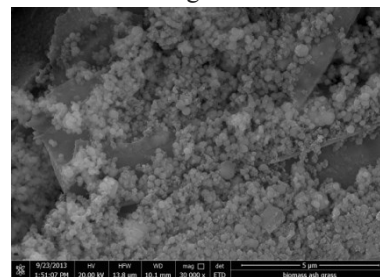
lignite - magnification 21000x



brown coal - magnification 16000x



straw – magnification 5000x



hay – magnification 30000x

Figure 1. SEM analysis of the combustion products

Microscopic analysis using an electron microscope FEI Quanta 450 FEG and EDS probe showed the crystalline structure occurring on the surface of the individual grains, while difference in the structure of fly ash from the combustion of biomass, where the majority share of unburned constituents fuel. EDS analyzes were fully consistent with the results of XRD analysis performed on a Bruker D8. The use of Raman spectroscopy in the case of combustion products difficult due to the higher fluorescence, better results were obtained by infrared spectroscopy, the samples were analyzed by transmission technique in KBr pellet in the device Nicolet IN10, respectively. IZ10. Totally dominant proportion of quartz and alkali feldspar, all the samples appeared sharp band 1385 cm^{-1} , which corresponds to the occurrence of nitrate ions.

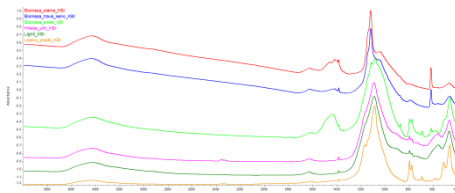


Figure 2. IR spectra of products after combustion of solid fuels

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Šašek, P., Viani, A., Mácová, P., Černá, M. The use of SEM and Micro-Raman microscopy to characterize by-products from combustion of solid fuels.