Fluorescence spectroscopy - applied tool for organic matter analysis

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Large applied projects in various sub-fields of environmental science studied and analyzed properties of organic matter. The “Life-Sure” is as continuation of started work for cost effective bottom sediments treatment where organic matter play important role of sorption of urban contaminants; “CONTRA” - beach wrack studies for advanced value-based bioeconomy development. Another project on Jurassic clay is interesting in discourse on Pleistocene glaciers glaciodynamics [1]. Material from field was tested by 3D fluorescence excitation-emission matrix (EEM) providing “fingerprints” for a single compound or a mixture of fluorescent components. Thus humic macromolecules might be well seen nevertheless structural units have variable effects on the wavelength as well as intensity of fluorescence. It decreases with increasing molecular size of the humic macromolecule [2]. For applied environmental projects this is well non-destructive tool to quantify the decomposition degree of organic matter requiring negligible amount of sample [3, 4]. This important method is valid for both organic matter and humic substances analytics [5]. Chemical nature of humic substances can be correlated to structural information, e.g., functional groups, poly-condensation, aromaticity, dynamic properties related to intermolecular interactions [6]. Acquired data from EEM provided significant input for scientific knowledge and innovation along with other analytical tools. This study was supported by Interreg “Baltic Beach Wrack - Conversion of a Nuisance To a Resource and Asset” (CONTRA), The “Life-Sure Project (LIFE15 ENV/SE/000279), the Regional Development Fund of European Union (ERAF) project No. 1.1.1.2/VIAA/1/16/001 under the post-doctoral research project (PostDoc) No. 1.1.1.2/VIAA/1/16/008.

[1] Graniczny *et al.* (2007) *Przegla˛d Geol.* **55**: 224-225. [2] Peuravuori *et al.* (2002) *Water Res.* **36**, 4552-4562. [3] Hur *et al.* (2009) *Org Geochem.* **40**, 1091–1099. [4] Wei *et al.* (2014) *Chemosphere* **95**, 261-267. [5] Kalbitz *et al.* (1999) *Biogeochemistry* **47**, 219–238. [6] Chen *et al.* (2003) *Environ. Sci. Technol.* **37**, 5701-5710.