TIME-RESOLVED FLUORESCENCE SPECTRA OF DIFFERENT SOIL HUMIC ACIDS AND STANDARD IHSS ELLIOTT SOIL

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Abstract

The aim of this work was study structure and dynamics of different soil humic acids (HAs). Object of our study were three samples HAs which were isolated from sandy soil - Arenosols (locality Ratíškovice, Czech Republic), Chernozem - Haplic Luvisol (locality Praha-Ruzyně, Crop Research Institute, Czech Republic) and standard HA Elliott Soil (1S102H). Isolation of soil HAs were performed according to the procedure recommended by the International Humic Substances Society (IHSS). All samples of soil HAs were characterized by Steady-State and Time-Resolved Fluorescence Spectroscopy. Emission wavelength dependent fluorescence decays are used to construct Time-Resolved Fluorescence Spectra (TRES) of soil humic acids, which are useful to obtained information on the excited state kinetics and heterogeneity of emissive species in a system. Time resolved fluorescence spectra (TRES), plotted as fluorescence intensity vs. wavelength, were constructed using i () and i (), and steady-state emission spectrum corrected for the quantum efficiency of the photomultiplier. Fluorescence spectra were recorded in aqueous solutions of 10 mgL1 HAs after overnight equilibration at room temperature, using FluoroLog luminescence spectrophotometer. The pH-value of the samples was adjusted to seven using a standard phosphate buffer. Steady-State emission spectra were recorded over the range of 390-600 nm at a constant excitation wavelength of 329 nm. Time-resolved fluorescence measurements were carried out by time-correlated single-photon counting (TCSPC) method. Fluorescence decay at each wavelength was deconvoluted using the instrument response function and a multiexponential function (three exponential functions). The fluorescence intensity values (in counts per second - CPS) of samples were corrected using method of Lakowicz.

Keywords: Humic acids, steady-state and time-resolved fluorescence spectroscopy, time resolved fluorescence spectra, lifetime, bathochromic shift

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