

CMLM2013

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“CMLM2013 - ГЛИНЫ,
ГЛИНИСТЫЕ МИНЕРАЛЫ
И СЛОИСТЫЕ МАТЕРИАЛЫ”

2ND INTERNATIONAL CONFERENCE

CLAYS,
CLAY MINERALS
AND
LAYERED MATERIALS

RUSSIA
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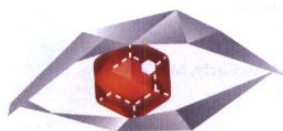


ПОЛЕ ~ ПОЛЕ



International Conference

Clays, Clay Minerals
and Layered Materials



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Book of Abstracts

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В книге представлены материалы Второй международной конференции "Глины, глинистые минералы и слоистые материалы – Clays, Clay Minerals and Layered Materials - CMLM2013". Издание представляет собой сборник тезисов докладов, которые посвящены актуальным вопросам изучения глинистых минералов и слоистых материалов, их структуры, синтеза, свойств и применения в современных отраслях промышленности и нанотехнологиях. Конференция имеет междисциплинарный характер и призвана объединить специалистов из различных областей фундаментальной и прикладной наук, работающих с глинами, глинистыми минералами и слоистыми материалами.

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Smectite quantification in forest-steppe soils by independent analytical approaches

Alexey Shinkarev¹, Alexander Shinkarev², Kamil Giniyatullin², Nadya Yeremeyeva²

X-ray diffraction methods have frequently been used for quantitative analyses of clay minerals in soils, but many factors must be taken into account. Soil studies usually ignored that the decrease in the basal diffraction intensity for smectites can be due to the disturbance of the strict one dimensional periodicity of their structure by soil organic matter (resistant to 30% H₂O₂) bound on the surface of clay particles within plane parallel aggregates and in labile inter layers.

Different types of pretreatments can be used to facilitate the identification of clayey minerals by causing selective changes in the inter-reticular distances of the clayey layers (*Soil Survey...*, 2004; *Pansu & Gautheyrou*, 2006). In this work, profile samples from virgin leached medium-deep clay loamy chernozem formed in clay loamy diluvium (Central Volga region) were used. Diffraction spectra of oriented preparations from the <2.5 µm fraction after Mg²⁺, Ca²⁺, K⁺ and Li⁺ saturation in different conditions (air dried, heated and glycol solvated) were recorded on a Bruker Axs D8 Advance diffractometer. The fraction was separated by the elutriation of a stable suspension after the treatment of the samples with 1 mol/l CH₃COOH and their washing with distilled water. Then, they were multiply treated with 30% H₂O₂ at room temperature for 10-14 days. It is considered, that treatment with H₂O₂ removes the external portion of organic components leaving the interlayer organic matter essentially intact.

There is depletion of X-ray diffraction patterns in the small angle area from the parent material to the upper part of a profile. In the diffraction patterns after saturation with ethylene glycol the changes in the upper part of the humus horizon clearly manifested in the high small-angle background, poor readability of smectite-ethylen glycol reflection and its little shift toward smaller Bregg's angles.

Except the qualitative description of 001 diffraction patterns the preliminary results for modeling spectra by Sybilla[®] software were received. In addition 001 diffraction patterns the powder diffraction patterns of these clay fractions were analyzed.

The solution algorithm is developed for a problem of smectite quantification in profiles of forest-steppe soils in the form of an operating sequence: diagnostic of initial parent material uniformity; smectite quantification in the <2.5 µm fraction by an adsorptive-luminescent method (*Эўпууи и др.*, 1975) and by thermogravimetric analyses (*Nieto et al.*, 2008); smectite quantification in the <2.5 µm fraction from parent material by X-ray-diffraction analysis using Sybilla software; updating of smectite quantification in a profile of forest-steppe soil according to adsorptive-luminescent and thermogravimetric analyses.

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