Random Electromagnetic Interferometry Method Applied to Aluminosilicates Analysis

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Abstract— The minerals based on aluminosilicates such as clays (kaolinite, montmorillonite) and zeolites (clinoptilolite) are abundant and inexpensive. These are used as adsorbents for the removal of bacteria and pollutants. It has been proven that the presence of hydrogen bonding interactions, and electrostatic forces of attraction on the surface of zeolites modified with anionic and/or cationic species have a significant effect on the process of microorganisms elimination. The treatment of the zeolite surface with concentrated acids or bases also modifies their hygroscopic properties.

This paper presents advances in the Dynamic Speckle Laser hydroadsorption analysis of materials based on a rich mineral "clinoptilolite" and their acidic and basic forms, which served as support for the incorporation of a binary complex sulfadiazine cobalt, promising in antibacterial drug design, fungicides, anti-inflammatory, etc..

To determine the water adsorption capacity of these materials as a function of time, the traditional method consists of introducing a sample in water and plotting the time dependent weight change in order to determine the amount of water adsorbed.

In this work we use a technologically advanced and methodologically more accurate method for determining the speed of hydroadsorption of a zeolite (clinoptilolite) based on the optical random interferometric phenomenon named "speckle", produced when a laser light illuminates a rough surface of zeolite. The data derived from the latter methodology is fitted using a numerical model that yields a better fitting as compared with several physicochemical (or physical) methods well established in the literature.