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X ray and scanning electronic microscopy study of the thermal treatment influences on morphology and mineral composition of Algerian kieselguhr

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Minerals and rocks are considered among materials that found a large use in the different sectors of the human life.
Algeria is one of the rich countries in mineral matters. And for exploitation rational of the wealth of our country one was interested in the survey of one of these mineral materials, called the kieselguhr.
Kieselguhr or diatomaceous earth consists of the skeletons of diatoms [1]. Instead of carbon; these algae deposit silicates from the water in order to form their skeletons in a precise and symmetrical shape [2].
This material has a considerable economic importance; it is used in several industrial sectors (filtration, the insulation...). The chemical and agro-alimentary industrys are the more consumers sectors of this material and specifically filtrations processes (70% of the world productions are destined to filtrations processes) [3].
This study shows the influence of thermal treatment at 1000 °C on the Morphology and mineral composition of Algerian raw kieselguhr. Pictures of scanning electronic microscope show the structure of particles of the kieselghur as well as the effect of the thermal treatment on the aspect of the particles. The XR study allows us to determine mineralogical composition of the raw kieselghur, which it constitutes by amorphous silica, calcite and the quartz. The thermal treatment leads to the formation of the wollastonite and the trydimite and to calcite desperation.
The present work permitted us to know the influence of thermal treatment on the morphology and mineral composition of Algerian kieselguhr.

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Three-dimensional Examination of Birefringent Materials Using a New Optical Technique

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We have developed a new optical technique that combines the Metripol™ imaging system (see www.metripol.com) with a microscope tilting-stage which allows us to obtain very precise birefringence information on anisotropic materials. The Metripol™ microscope uses a combination of a rotating polarizer and a circular analyzer to separate out three types of images: one representing the light transmission through the specimen, one showing the orientation angle of one of the axes of a section of the optical indicatrix measured from the predetermined direction, and one giving quantitative information on $|\sin\delta|$ at any point within the image captured by the CCD camera, where δ is the phase difference introduced by the birefringent specimen.
Examination of birefringent materials using the Metripol™ imaging system with a tilting-stage reveals the three-dimensional character of their anisotropic properties and provides a versatile optical technique, which has applications in the fields of crystallography, mineralogy, geology, archaeology, chemistry, biology, etc. The method may be used for a broad range of applications, including phase transition studies, mineral analysis, strain analysis, location of defects through strain fields, etc.
We have shown that by combining a computer-controlled two-axis tilting-stage on a microscope with the Metripol™ technique, it is possible to collect reliable three-dimensional data for $|\sin\delta|$ and the orientation angle ϕ in order to obtain three-dimensional birefringence information for optically anisotropic samples in any general alignment. The technique also enables precise information on the optical orientation, sign of the optical indicatrix and the optic angle of the sample to be obtained. Moreover, the mean refractive index of the sample may be estimated, and hence all the refractive indices can be calculated. In addition to this, an unknown crystalline material may be identified, or at least classified within a specific group of crystalline materials.
One of the most important advantages of our tilting-stage technique is that it enables us to obtain information about the preferred orientation as well as about the birefringence of the crystallites; it can easily detect any changes in anisotropy caused by strain and deformations formed during growth of the polycrystalline material. Moreover, any changes occurring as a result of recrystallisation or phase transformations can be precisely recorded and analyzed.

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