placed in laboratory at a room temperature. Consequently samples were ready for testing by EIS. The Nyquist plots were obtained for the concrete sample in the absence and presence of Urmia’s pozzolan in 5% concentration. The Nyquist plots were analyzed using Zview software to obtain the impedance parameters. In the presence of Urmia’s pozzolan, concrete material clearly showed a decrease in permeability which in turn lead to increase resistivity. Cement resistivity has been increased after the addition of Urmia’s pozzolan.

Reference

Study of nano SiO2 suspension influence on the resistivity of SCC concrete by electrochemical impedance spectroscopy

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World wide more concrete is used than any other man made material with approximately 12 billions tones being manufactured annually. SCC is a concrete; made with appropriate materials, properly mixed, transported, placed, consolidated. The microstructure of concrete mainly controls the physical/chemical phenomena associated with water movements and the transport of ions in concrete. This work therefore presents a summary of the experimental procedure and the results obtained during nano SiO2 suspension addition on the SCC concrete sample’s electrical resistivity using electrochemical impedance spectroscopy (EIS). A total of two concrete samples with W/C ratio of 0.4 (first sample; without nano SiO2, second sample; with nano SiO2) were prepared. The samples were demolded 24h after preparation; and Curing was done in lime water for 7 days. Consequently they were removed from the water bath and placed in laboratory at a room temperature. They were tested by EIS. The Nyquist plots obtained for the concrete samples in the absence and presence of 0.5% nano SiO2 suspension. The Nyquist plots were analyzed using Zview software to obtain the impedance parameters. The resistivity of sample with 0.5% nano SiO2 is lower than that of sample without nano SiO2. This result is unexpected in this work, but it can be explained by the curing time, when the curing time of samples is to be low (such as 7 days), the nano SiO2 can not complete the pozzolanic reaction. Nano SiO2 suspension addition showed a decrease in the value of electrical resistivity of SCC.

Reference

Fabrication of Nanocrystalline MoSi2 Powder Using Combustion Synthesis and Investigation of its Properties

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Molybdenum disilicide (MoSi2) is a well known material and has a vast application in industry. The reason of being under attention can be attributed to its special properties at elevated temperature such as hardness, chemical stability, good strength, electrical conductivity and excellent wear resistance [1-4]. There are many methods for production of Molybdenum disilicide and in the current research MoSi2 was fabricated using self-propagation combustion method. For this purpose two series of materials including MoO3, SiO2, Al and C powders and MoO3, SiO2, Mg and Si powders were mixed mechanically and milled for 85 minute. The milled powders were pressed to achieve discs with typical dimension of 7 mm in diameter and 12 mm in height. Combustion synthesis was ignited using an electric arc. The synthesized samples were characterized using XRD, SEM, DSC, TEM techniques. The size of particles obtained in this method is greater than the others, due to the high temperature in the synthesis.

Reference

Preparation and characterization of α-Fe2O3 nanoparticles and adsorption isotherms investigation of Cd(II) on hematite

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α-Fe2O3 is a very important multifunctional material which is used in fine ceramics, catalysts, pigments and is one of the best adsorbent for removal of heavy metals from aqueous solution [1]. In this study α-Fe2O3 nanoparticles were prepared by sol-gel combustion technique [2]. The aim of this study to investigate the ability of α-Fe2O3 to adsorbed heavy metals like Cd.Iron nitrate have been used as precursors and citric acid as an oxidising agent to prepare hematite. The α-Fe2O3 powders were characterized by Scanning Electron Microscopy (SEM), X-ray diffraction (XRD), and Fourier Transform Infrared (FTIR) spectroscopy and adsorption processing evaluate through Batch method. From the obtained XRD patterns, the particle size of α-Fe2O3 has been determined. The obtained XRD pattern of the hematite is shown in fig.1. Consequently, one can obtain the average particle size, from the broadening effect of the most intense peak employing the scherrer formula. The particle size of hematite are found to be 41/58 nm. Also as a result the particle size decrease with increase in milling time.

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