Cuadernos de Investigación

Publicaciones , ponencias, patentes, registros y emprendimientos
- 2010 -

DIRECCIÓN DE INVESTIGACIÓN Y DOCENCIA
Universidad EAFIT

ISSN 1692-0694. Medellín. Marzo de 2011
Documento 86-032011

GRUPO DE INVESTIGACIÓN EN ELECTROMAGNETISMO APLICADO (GEMA)

PUBLICACIÓN INTERNACIONAL

DEMENICIS, L.; MARULANDA, J. I.; LIMA, R. A. A.; CARVALHO, M. C. R.
Dielectric properties characterization of high dielectric constant thick films
In: MICROWAVE AND OPTICAL TECHNOLOGY LETTERS / Vol. 52, No. 10, Oct. 2010, pp. 2339-2344
ISSN: 1098-2760
Datos de Indexación: DOI 10.1002/mop

Abstract
A technique for the characterization of microwave dielectric properties of high dielectric constant thick films at room temperature is proposed, using multilayered coplanar waveguide transmission lines with high dielectric constant thick films deposited over the lines. Besides the simplicity, the technique allows the characterization of the films under similar conditions to those in which they will operate as compact devices in multilayered configurations. Time domain analysis and experimental results for 61-micron thick Barium Titanate films have confirmed the relative dielectric constant and loss tangent values (respectively, 100 and 0.3) predicted by the frequency domain characterization proposed.

Contacto
José Ignacio Marulanda B. – jmarulan@eafit.edu.co
Grupo de Electromagnetismo Aplicado

PUBLICACIÓN INTERNACIONAL

FUENTEALBA, Patricio; DAVID, Jorge; y GUERRA, Doris
Density functional based reactivity parameters: thermodynamic or kinetic concepts?
En: Journal of molecular structure: Theochem. Vol: 943, pags: 127-137, 2010
ISSN: 0166-1280.
Datos de indexación: A1 en Publindex. Science Direct. SCOPUS.

Abstract
The Density Functional Theory of chemical reactivity has provided and effective way to develop a mathematical framework for many empirical chemical concepts. In this work, the relation of some of the proposed indexes with the thermodynamic and kinetic effects on a chemical reaction will be discussed. In order to give a numerical support to the discussion, families of SN2 reactions and Diels–Alder reactions have been studied. It is concluded that the theoretical proposed indexes represent neither thermodynamic nor kinetic effects but a combination of both depending on the type of reaction.

Contacto
Jorge David Caro – jdavidca@eafit.edu.co
Grupo de Electromagnetismo Aplicado (GEMA)

PUBLICACIÓN INTERNACIONAL

HINCAPIÉ, Gina; ACELAS, Nancy; CASTAÑO, Marcela; DAVID, Jorge; and RESTREPO, Albeiro
Structural studies of the water hexamer
En: Journal . Phyicals. Chemistry A. Vol: 114, pags: 7809-7814, 2010
ISSN: 0009-2614.
Datos de indexacion: A1 en Publindex. ISI, SCOPUS.

Abstract
In this paper we report the geometries and properties of 24 structural isomers located on the MP2/6-311++g** potential energy surface of the water hexamer. At least 15 structural patterns are located within 3 kcal/mol of the most stable conformation, leading to a very complex potential energy surface, several isomers having significant contributions. A quadratic correlation between the distance from the proton to the center of the hydrogen bond with the distance between oxygen atoms for all clusters is

reported. MP2/6-311++g** and CCSD(T)/aug-cc-pvdz//MP2/6-311++g** predict different stabilization orderings but are in good agreement for binding energies. Compact structures are energetically favored by electronic energies with zero point energy corrections, while noncompact cyclic structures are preferred when temperature and entropy are accounted for.

Contacto
Jorge David Caro – jdavidca@eafit.edu.co
Grupo de Electromagnetismo Aplicado (GEMA)

PUBLICACIÓN INTERNACIONAL

MURILLO, Juliana; DAVID, Jorge; and RESTREPO, Albeiro
Insights into the structure and stability of the carbonic acid dimer.

En: Physical Chemistry Chemical Physics, Received 23rd February 2010, Accepted 10th June 2010, Doi:10.1039/C003520c, 2010
ISSN: 14639076
Datos de indexacion: A1 en Publindex. ISI, SCOPUS.

Abstract
In this paper we report the geometries and properties of 40 structural isomers located on the MP2/6-311++G** PES of the carbonic acid dimer. All six possible combinations of carbonic acid monomers were considered. The dimers are divided into six geometrical motifs. Our data suggests that combinations of anti–anti monomers do not necessarily lead to larger stabilization energies in the formation of the dimers. MP2 underestimates the relative binding energies with respect to CCSD(T) by as much as 3.2 kcal mol-1. At least 3 different dimers which may contribute to the stability of carbonic acid are predicted to have significant populations. Binding energy is only directly related to relative stability when comparing dimers formed from the same monomers. Overall stabilization is mainly dictated by attractive electrostatic interactions via cooperative polarization by virtue of the spatial arrangement of the dipole moment components along the polar bonds. Shorter O--H bond distances and larger bond orders predicted for the hydrogen bonds directed towards carbonyl groups make for stronger hydrogen bonding than in O--H bonds directed towards hydroxyl groups.

Contacto
Jorge David Caro – jdavidca@eafit.edu.co
Grupo de Electromagnetismo Aplicado (GEMA).

PUBLICACIÓN INTERNACIONAL

DAVID, Jorge, GUERRA, Doris, HADAD, Casier; and RESTREPO, Albeiro
Structure and Reactivity of the 1Au6Pt Clusters.

En: The Journal of Physical Chemistry A, Received , July 14, Accepted August 24, Doi: 10.1021/jp106544w, 2010
ISSN: 1089-5639
Datos de indexacion: A1 en Publindex. ISI, SCOPUS.

Abstract
In this paper we report the geometries, properties, and reactivity descriptors of 12 structural isomers located on the MP2/SDDALL potential energy surface of the 1Au6Pt binary clusters. A nonplanar, D3d symmetry, cyclohexane chairlike structure is predicted to be the global minimum. Binding energies per atom in the range ≈44-51 kcal/mol account for very stable clusters. The relative stability of the clusters is directly related to all global and local reactivity descriptors. All structures are predicted to have large electron affinities. The chemical environment of the Pt atom on the structures plays a central role in the resulting relative stabilities and global and local reactivities. Our results show that more peripheral Pt atoms are more likely to be involved in electron-accepting processes.

Contacto
Jorge David Caro – jdavidca@eafit.edu.co
Grupo de Electromagnetismo Aplicado (GEMA).

PUBLICACIÓN NACIONAL

GUARÍN ZAPATA, Nicolás; y VELÁSQUEZ TORRES, Alvaro Andrés

Caracterización de Imanes para aplicación en sistemas de sensado de posición.

En: Revista Colombiana de Física, Vol. 41 No. 4, pgs: 823-827. Aceptado 06-03-2010, publicado 25-06-2010.
ISSN: 0120-2650

Abstract

This paper reports the characterization of a set of Neodymium magnets with different sizes and geometries, which is devoted to determine the influence of the former parameters both in the magnitude as in the direction of the magnetic field produced in: a) points near but not on an symmetry axis of the magnet and b) points placed along the symmetry axis of the magnet to different distances from it. Characterization was performed with a Hall Effect sensor, which was accompanied of a conditioning signal circuit, which allows obtaining an output voltage proportional to the magnetic flux density present in the sensing region. The signal given by the sensor allows to measure not only the magni-tude of the magnetic field present in the sensing region but the orientation of the magnetic field lines in that region through the sign of the induced Hall voltage. The results of the measurements suggest some criteria for choosing the most convenient type of magnet for application in sensing of the posi-tion of magnetized objects, or objects which contain that type of magnets inside, as well as for giving tracks to prevent overlapping errors in the determination of the position of multiple neighboring mag-nets or objects which contain that type of magnets inside.

Contacto

Álvaro Andrés Velásquez Torres – avelas26@eafit.edu.co
Nicolás Guarín Zapata – nguarinz@eafit.edu.co
Grupo de Electromagnetismo Aplicado, línea de Instrumentación.

PONENCIA INTERNACIONAL

MARULANDA, J. I.; CARVALHO, M. C. R.; y DEMENICIS, L. S.

Coplanar Transmission Lines with Conductor Thicknesses Thinner than the Skin Depth.

En: 2010 ANSYS South American Conference ESSS Users Meeting, Atibaia, SP-Brasil, Oct. 2010.

Abstract

Using HFSS 12 (Ansoft 3D Full-wave Electromagnetic Field Simulation) a coplanar waveguide (CPW) with extremely thin conductors is modeled and simulated in the frequency range from 50 MHz to 10 GHz.

According with theory, for the conductors thickness considered in this work (< 1 μm), the transmission characteristics of a CPW are strongly affected by the skin depth effect. To simulate such structures, special cares have to be done to adequately solve the fields inside the conductors, especially at low and intermediate frequencies, at which the skin depth is more accentuated.

Some solution options provided by HFSS 12 were used to simulate the proposed structure and the results are presented to compare the differences among them. These simulations were made to extract the transmission characteristics of a previously elaborated CPW with 0.2 μm thickness aluminum lines printed over a commercial alumina substrate. By comparison between measured and simulated results, the best solution for this thin conductor structure could be determinate.

Contacto

José Ignacio Marulanda B. jmarulan@eafit.edu.co
Grupo de Electromagnetismo Aplicado

PONENCIA INTERNACIONAL

VELÁSQUEZ TORRES Álvaro Andrés; CARMONA VALENCIa Augusto; VELÁSQUEZ Daniel; and ÁNGEL TORO Luciano

Design and Construction of an Electromechanical Velocity Modulator for Mössbauer Spectroscopy

En: XXII Latin American Conference on the Applications of the Mössbauer Effect, Lima Perú, 8 de noviembre de 2010 http://web.lacame2010.org/

Abstract

In this paper we report the design, construction and characterization of an electromechanical velocity modulator for application in Mössbauer spectroscopy. The modulator was constructed with copper coils, Neodymium magnets, steel cores and polymeric membranes. The magnetic field in the driving and velocity sensing stages was analyzed by the finite element method, which showed a linear relation between the magnetic field in the region of motion of both coils and the position of the coils within the steel cores. The results obtained by computational simulation allowed us to optimize geometries and dimensions of the elements of the system. The modulator presented its first resonance frequency at 16.7 Hz, this value was in good agreement with that predicted by a second order model, which showed a resonant frequency of 16.8 Hz. The linearity of the velocity signal of the modulator was analyzed through an optical method, based on a Michelson-Morley interferometer, in which the modulator moved one of the mirrors. Results showed a satisfactory linearity of the velocity signal obtained in the sensing coil, whose correlation with a straight line was around 0.99987 for a triangular reference waveform.

Contacto

Alvaro Andrés Velasquez Torres – avelas26@eafit.edu.co
Grupo de Electromagnetismo Aplicado

POSTER INTERNACIONAL

ARAMBURO, Alvaro; MORALES, VELÁSQUEZ, TORRES Alvaro Andrés, URQUIJO MORALES Jeaneth and BAGGIO SAITOVITCH Elisa

Study of the effect of the Cu2+ on the formation of magnetite: en la misma conferencia anterior.

En: XXII Latin American Conference on the Applications of the Mössbauer Effect, Lima Perú, 11 de noviembre de 2010 http://web.lacame2010.org/

Abstract

Samples of magnetite, both pure and doped with divalent copper, Fe3-xCuxO4, with x = 0, 0.05, 0.10 and 0.20 at. %, were synthesized hydrothermally. The samples were characterized by Atomic Absorption Spectroscopy, Mössbauer Spectroscopy, X-ray diffraction, Scanning Electron Microscopy and SQUID magnetometry. The analyses made by the above techniques showed that as the Cu2+ concentration increases, a simultaneous reduction in the magnetic and structural parameters takes place, namely: magnetic hyperfine interactions at octahedral sites, particle size and lattice constant. Degradation in the particles morphology as well as a distribution of their size were also observed. Our study points two important effects of Cu2+ in magnetite, the first one is its incorporation within the structure, replacing Fe2+ ions and decreasing both the magnetic hyperfine interactions at octahedral sites and the bulk magnetization, the second one is the contraction of the crystalline lattice of magnetite, because incorporation of Cu2+ within the structure, generation of vacancies or both simultaneous effects.

Contacto

Alvaro Andrés Velasquez Torres:avelas26@eafit.edu.co
Grupo de Electromagnetismo Aplicado

POSTER INTERNACIONAL

LONDOÑO, Lopez Martha E, ARROYAVE, Franco, Mauricio, JARAMILLO, Juan Manuel
Study of physicochemical characteristics and morphology of Polyvinyl alcohol hydrogels formed by freezing/thawing processes
En: SLAP Costa Rica, http://www.una.ac.cr/slap/

Abstract
Hydrogels are materials with useful properties for application in industry area and medicine. The properties of poly(vinyl alcohol) –PVA – hydrogels obtained by freezing/thawing -F/T- technique depend of processing parameter as number of freezing and thawing cycles an increase in this parameter increase the degree of crystallinity [1]. In this work we examinate the effect of the number of freezing and thawing cycles in morphology, swelling behavior, thermal and mechanical properties of PVA hydrogels obtained by F/T processes.

Contacto
Juan Manuel Jaramillo O. – jjaram44@eafit.edu.co
Grupo de Electromagnetismo Aplicado

PONENCIA NACIONAL

MARULANDA, J. I.; CARVALHO, M. C. R. y DEMENICIS, L. S.
Microwave Characterization of High Dielectric Constant Thick Films by the Coplanar Waveguide Linear Resonator method.
En: IX Escuela Nacional de la Materia Condensada. Ibagué-Tolima, Oct. 2010.

Abstract
The characterization of some titanate (TiO3) based thick films using the coplanar waveguide linear resonator technique is presented. The dielectric constant and losses were measured in the frequency range between 40 MHz and 20 GHz at room temperature. The films were fabricated by the screen-printed method with thicknesses from 100 to 165 μm. Relationships between dielectric constant and concentration ratio for BTO-CCTO and MTO-CTO composites are also presented.

Contacto
José Ignacio Marulanda B. jmarulan@eafit.edu.co
Grupo de Electromagnetismo Aplicado

GRUPO DE INVESTIGACIÓN EN ESTUDIOS CULTURALES

PUBLICACIÓN NACIONAL

ESCOBAR PAREJA, María del Rosario
El arte del cuidado de sí
En: Flores para Ethel Gilmour (1940-2008), Catálogo de la exposición, Universidad EAFIT/Museo de Arte Moderno de Medellín, p. 13-16 Octubre 2010.
ISBN 978-958-720-072-0

Resumen
Texto que da una mirada sobre la relación entre arte y vida en Ethel Gilmour.

Contacto
María del Rosario Escobar Pareja. mescobar@eafit.edu.co
Grupo de Estudios Culturales

PUBLICACIÓN NACIONAL

ESCOBAR PAREJA, María del Rosario
Yo fui contando lo que fui viendo, retrato de un país por Débora Arango
Catálogo de la exposición que lleva el mismo nombre. Museo de Arte Moderno de Medellín. diciembre de 2010.
ISBN 978-958-98763-8-1

Resumen
Visión panorámica sobre Débora Arango y las transgresiones que hizo en los años 50 y 60, así como la recepción de su trabajo en los años ochenta.