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Materials Characterization

 Springer

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Contents

Part I Characterization of Welding and Joining of Materials

- 1 Metallurgical Investigation of Heat Input on Robot-Welded Joints Using GMAW Pulsed Process on Structural Steel.....** 3
I. Guzman-Flores, B. Vargas-Arista, J.J. Gasca-Dominguez,
J. del Prado, E. Garfias-Garcia, and L. Rios-Vargas
- 2 Distortion Evaluation in Dissimilar Stainless Steel Joints Welded by GMAW Process** 15
A.F. Miranda Pérez, G.Y. Pérez Medina, E. Hurtado Delgado,
and F.A. Reyes Valdés
- 3 3-D Porosity in T-Welded Connections Repaired by Grinding and Wet Welding** 25
G. Terán, S. Capula-Colindres, R. Cuamatzi-Meléndez,
D. Angeles-Herrera, and A. Albiter

Part II Characterization of Nanostructured Materials

- 4 Synthesis and Characterization of Bimetallic Nanoparticles by Cs-Corrected Scanning Transmission Electron Microscopy** 35
R. Esparza, O. Téllez-Vázquez, A. Ángeles-Pascual, and R. Pérez
- 5 Application of Silver Decorated Carbon Nanotubes for Environmental Ozone Sensing.....** 43
S. Capula Colindres, G. Terán, V. Garibay Febles,
L.A. Villa Vargas, and J.R. Vargas García
- 6 Spectroscopic and Structural Characterization of Pd Nanoparticles Supported on Hydrotalcite-Like Materials.....** 51
Miguel Angel de la Rosa-Guzmán, María de Jesús Martínez-Ortiz,
Nancy Castillo, Carlos Alberto Ramírez-Salazar, Andrés Méndez-Ceja,
and Juan Esteban Canseco-Morales

7	Structural and Optical Characterization of ZrO₂ and Y₂O₃-ZrO₂ Nanopowders	59
	Nadiia Korsunskaya, Anton Zhuk, Vasyl Papusha, Oleksandr Kolomys, Yuliya Polishchuk, Yurii Bacherikov, Viktor Strelchuk, Vasyl Kladko, Tetyana Konstantinova, Tetyana Kryshtab, and Larysa Khomenkova	
Part III Characterization of Steels Used in the Oil Industry		
8	Improvement of Mechanical Properties of API X-65 Steel by Non-conventional Heat Treatment	71
	Constantino Natividad Murillo, Rafael García Hernández, Víctor Hugo López Morelos, and Melchor Salazar Martínez	
9	Aging of Cast Heat Resisting Alloys 35Cr–45Ni–0.1C (MORE40X) and 40Cr–45Ni–0.2C (UCX)	79
	Ileri Aydée Sustaita Torres, Sergio Haro Rodríguez, and Rafael Colás Ortiz	
10	SCC of X-65 Weldment Assessment in Diluted NaHCO₃ Solutions with Chloride and Sulfate Ions	89
	M.A. Espinosa-Medina, G. Carbajal-De la Torre, C. Ángeles-Chavez, and J.G. González-Rodríguez	
11	Electrochemical Characterization of X60 Steel Exposed to Different Soils from South of México.....	101
	L.M. Quej, M.J. Míreles, R. Galvan-Martinez, and A. Contreras	
Part IV Characterization of Stainless Steels		
12	Effect of the Perpendicular Electromagnetic Field in the 304 Austenitic Stainless Steel Welding in a Single Pass.....	119
	Rafael García, Rafael Cortes, Diana L. García, and Víctor H. López	
13	On the Effect of Crosshead Velocity on Polycrystalline Flow During Tension Testing of a 430 Stainless Steel.....	129
	Elizabeth Garfias-García, Juan Daniel Muñoz-Andrade, Pablo Gerardo Rodríguez-López, Miriam Aguilar-Sánchez, and Benjamín Vargas-Arista	
Part V Characterization of Composite Materials		
14	Effect of FSW Parameters on Microstructure of Aluminum Matrix Composites Joints	139
	O. Cuevas Mata, A.F. Miranda Pérez, F.J. García Vázquez, G.Y. Pérez Medina, and F.A. Reyes Valdés	

15 Electrochemical Characterization of the Aluminum–Copper Composite Material Reinforced with Titanium Carbide Immersed in Seawater	147
N. Alvarez-Lemus, C.A. Leon, A. Contreras, R. Orozco-Cruz, and R. Galvan-Martinez	
Part VI Characterization of Materials for Medical Applications	
16 Adsorption of Arsenite from Aqueous Solution on Mg/Al Hydrotalcite	159
E. Ramos-Ramírez, Norma Leticia Gutiérrez Ortega, R. Zarraga-Núñez, and F.J. Acevedo-Aguilar	
17 Synthesis and Characterization of Magnetic Nanoparticles for Biomedical Applications	169
J.R. Piñón-Hernández, I.G. Becerril-Juárez, A. Ángeles-Pascual, R. Pérez, and R. Esparza	
Part VII Characterization of Materials for Industrial Applications	
18 A Green Method for Graphite Exfoliation Using a Mechanochemical Route.....	179
I. Estrada-Guel, F.C. Robles-Hernandez, and R. Martínez-Sánchez	
19 Characterization of Wurtzite Type ZnS Grown by RF Magnetron Sputtering.....	189
Joel Díaz-Reyes, Roberto S. Castillo-Ojeda, and Javier Martínez-Juárez	
Part VIII Characterization of Intermetallic Materials	
20 Mechanical Properties of Spray-Atomized FeAl40 at.%Al Alloys.....	199
M. Amaya, J.M. Romero, L. Martinez, and R. Pérez	
21 Structural Characterization of Fe₂Al₅ Intermetallic Compound After Reaction with Water to Release Hydrogen	209
J. Luis López-Miranda, R. Esparza, and G. Rosas	
Author Index	219
Subject Index.....	221

Chapter 9

Aging of Cast Heat Resisting Alloys 35Cr–45Ni–0.1C (MORE40X) and 40Cr–45Ni–0.2C (UCX)

Ileri Aydée Sustaita Torres, Sergio Haro Rodríguez, and Rafael Colás Ortiz

Abstract Heat resisting cast alloys are designed to sustain operation while are exposed to temperatures greater than 650 °C. These alloys have widespread uses in petrochemical industry in pyrolysis and reformer furnaces, etc.; in addition, they can be hold into oxidizing, sulfidizing, or carburizing environments. The principal attributes of the alloys are creep strength and corrosion resistance. The purpose of this study was to explore the effects of chromium contents in two centrifugal cast pipes of Ni-base heat resistant alloys, one MORE40X 0.1C and the other UCX 0.2C during aging. The behavior of this alloys during aging was examined by optical and scanning electron microscopy in samples aged at 750 °C up to 1,000 h. The microstructural evolution was analyzed on selected samples and images using secondary and backscattered electron detectors and with X-ray energy dispersive spectroscopy. The main microstructural changes in primary and secondary carbides that occurred during aging were described and related to mechanical properties in two alloys. The microstructure as cast materials shows a primary carbides network, in austenitic matrix. The aging times produced different changes in the alloys, which dependent of the composition, morphology, distribution and in the transformation of carbides inside them. It was found that aging promoted the increment in tensile strength and the reduction in ductility. However the mechanical properties of UCX (aged at 750 °C up to 1,000 h) are better with respect to MORE40X (as cast).

Keywords Heat resisting cast alloys • Strength • Corrosion resistance • Optical • Scanning electron microscopy (SEM)

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