Keynote Forum

35 YEARS OF EXCELLENCE IN MEDICAL PUBLISHING

Osman Adiguzel
Firat University, Turkey

Thermomechanical and Thermoresponsive Reactions Governing Reversibility in Shape Memory Alloys

A series of materials take place in a class of advanced smart materials with adaptive properties and stimulus response to the external changes. Shape memory alloys take place in this group, with the shape reversibility characters and capacity of responding to changes in the environment. These alloys exhibit a peculiar property called shape memory effect, which is characterized by the recoverability of two certain shapes of material at different temperatures. These alloys have dual characteristics called thermoelasticity and superelasticity, from the viewpoint of memory behavior. These phenomena are governed by thermomechanical and thermoresponsive reactions at the atomic level. These transformations are stress induced martensitic transformations. Thermal induced martensite occurs along with crystal twinning in self-accommodating manner on cooling and ordered parent phase structures turn into twinned martensite structures. Stress induced martensitic transformations occur along with crystal or lattice detwinning reactions by stressing material in low temperature conditions. Superelasticity is performed by stressing and releasing material at a constant temperature in the parent phase region, and shape recovery is performed simultaneously upon releasing the applied stress. Superelasticity exhibits the normal elastic materials, but it is performed in a non-linear way; stressing and releasing paths are different in the stress-strain diagram, and hysteresis loop refers to energy dissipation. These alloys are used in the building industry, against the seismic events, due to this property. Thermal induced martensitic transformation occurs with the cooperative movement of atoms in <110>- type directions on {110}-type planes of the austenite matrix, by means of shear-like mechanism.

Copper based alloys exhibit this property in the metastable β-phase region. Lattice invariant shear is not uniform in copper-based shape memory alloys, and causes the formation of long-period layered martensitic structures with lattice twinning on cooling. The long-period layered structures can be described by different unit cells as 3R, 9R or 18R depending on the stacking sequences on the close-packed planes of the ordered lattice. The unit cell and periodicity is completed through 18 layers in direction z, in case of 18R martensite, and unit cells are not periodic in short range in direction z. In the present contribution, electron diffraction and x-ray diffraction studies were performed on two copper based CuZnAl and CuAlMn alloys. Electron diffraction patterns and x-ray diffraction profiles show that these alloys exhibit superlattice reflections in martensitic conditions. Specimens of these alloys aged at room temperature in martensitic condition, and a series of x-ray diffractions were taken during aging at room temperature. Reached results show that diffraction angles and peak intensities change with aging time at room temperature. Specially, some of the successive peak pairs providing a special relation between Miller indices come close to each other, and this result refers to the rearrangement of atoms in a diffusive manner.

Biography

Osman Adiguzel graduated from the Department of Physics, Ankara University, Turkey in 1974 and received PhD- degree from Dicle University, Diyarbakir-Turkey. He studied at Surrey University, Guildford, UK, as a post-doctoral research scientist in 1986-1987, and studied on shape memory alloys. He worked as research assistant, 1975-80, at Dicle University and shifted to Firat University, Elazig, Turkey in 1980. He became professor in 1996, and he has already been working as professor. He published over 80 papers in international and national journals; He joined over 100 conferences and symposia in international and national level as participant, invited speaker or keynote speaker with contributions of oral or poster. He served as the program chair or conference chair/co-chair in some of these activities. In particular, he joined in the last seven years (2014 - 2020) over 70 conferences as Keynote Speaker and Conference Co-Chair organized by different companies. He supervised 5 PhD- theses and 3 M.Sc.- theses. He served in the Directorate of Graduate School of Natural and Applied Sciences, Firat University, in 1999-2004. He received a certificate awarded to him and his experimental group in recognition of the significant contribution of 2 patterns to the Powder Diffraction File – Release 2000. The ICDD (International Centre for Diffraction Data) also appreciates the cooperation of his group and interest in the Powder Diffraction File.

oadiguzel@firat.edu.tr

Shrikant S Maktedar

National Institute of Technology, India

Design & Development of Graphene-based Materials for Electrocatalytic Application

Benchmark materials like Pt/C were used as references in the electrocatalytic applications of materials. However, it is an expensive and precious metal with less abundance. Therefore, to provide cost and efficient alternative design & development of electrocatalytic materials is the need of an hour. Owing to this fact & due to astonishing properties, 2D materials like graphene have emerged as scaffolds with numerous active sites. These hybrid graphene-based materials can truly act as an electrocatalyst for hydrogen evolution reaction (HER), oxygen evolution reaction (OER) and oxygen reduction reaction (ORR). As prepared catalyst has been widely characterized by using sophisticated analytical techniques such as near-edge X-ray adsorption spectroscopy (NEXAS), 13C solid-state NMR, HR-XPS, HR-TEM, SAED, XRD, SEM, AFM, Raman, TG-DTA, FTIR, UV-Vis etc. Furthermore, structural features have revealed the potential of these materials as an advanced functional material towards metal-free supercapacitor application. Apart from all these things, and environmental impact of newly prepared catalysts need to be explored for the confirmation of their biocompatibility. Biological studies have ascertained the same. Hence, in present studies, the emphasis is given to the design & development of benign materials for electrocatalytic applications for energy conservation and storage.

Biography

Shrikant S Maktedar is an Assistant Professor at the Department of Chemistry, National Institute of Technology, Srinagar, J&K, India. He received B.Sc. Degree in Chemistry from Ramkrishna Paramhansa Mahavidyalaya, Osmanabad (Babasaheb Ambedkar Marathwada University, Aurangabad) in 2008 and M.Sc. Degree in Physical Chemistry from Dept. of Chemistry, Babasaheb Ambedkar Marathwada University, Aurangabad in 2010. He has completed his PhD from Central University of Gujarat, Gandhinagar, India. In the last 10 years, he has been working in the field of carbonaceous materials with emphasis on their multifunctional applications. Shrikant has published more than 10 research publications in peer-reviewed international journals of repute, one book chapter and two full-length conference papers. He has served as a reviewer for a few international journals of repute. After his joining NIT Srinagar he is serving as PhD supervisor and has established the Materials Research Laboratory at Dept. of Chemistry.

shrikant@nitsri.ac.in

Abdeen Mustafa Omer
Energy Research Institute (ERI), United Kingdom

Geothermal Energy for Refrigeration and Air Conditioning, Sustainable Development and the Environment

Geothermal heat pumps (GSHPs), or direct expansion (DX) ground source heat pumps, are a highly efficient renewable energy technology, which uses the earth, groundwater or surface water as a heat source when operating in heating mode or as a heat sink when operating in a cooling mode. It is receiving increasing interest because of its potential to decrease primary energy consumption and thus reduce emissions of greenhouse gases (GHGs). The main concept of this technology is that it uses the lower temperature of the ground (approximately <32°C), which remains relatively stable throughout the year, to provide space heating, cooling and domestic hot water inside the building area. The main goal of this study was to stimulate the uptake of the GSHPs.

Recent attempts to stimulate alternative energy sources for heating and cooling of buildings have emphasised the utilisation of ambient energy from the ground sources and other renewable energy sources. The purpose of this study, however, was to examine the means of reducing of energy consumption in buildings, identifying GSHPs as an environmental friendly technology able to provide efficient utilisation of energy in the buildings sector, promoting the use of GSHPs applications as an optimum means of heating and cooling, and presenting typical applications and recent advances of the DX GSHPs. The study highlighted the potential energy saving that could be achieved through the use of ground energy sources. It also focused on the optimisation and improvement of the operation conditions of the heat cycle and the performance of the DX GSHP. It is concluded that the direct expansion of the GSHP, combined with the ground heat exchanger in foundation piles and the seasonal thermal energy storage from solar thermal collectors, is extendable to more comprehensive applications.

Biography

Abdeen Mustafa Omer is an Associate Researcher at Occupational Health Administration, Ministry of Health and Social Welfare, Khartoum, Sudan. He obtained both his PhD degree in the Built Environment and Master of Philosophy degree in Renewable Energy Technologies from the University of Nottingham. He is a qualified Mechanical Engineer with a proven track record within the water industry and renewable energy technologies. He graduated from the University of El Menoufia, Egypt, BSc in Mechanical Engineering. His previous experience involved being a member of the research team at the National Council for Research/Energy Research Institute in Sudan and working as director of research and development for National Water Equipment Manufacturing Co. Ltd., Sudan. He has been listed in the book WHOâ€™S WHO in the World 2005, 2006, 2007 and 2010. He has published over 300 papers in peer-reviewed journals, 200 review articles, 7 books and 150 chapters in books.

abdeenomer2@yahoo.co.uk