CONTEMPORARY METALLIC MATERIALS

Md Abdul Maleque
Iskandar Idris Yaacob
Zahurin Halim

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Edited by:
Md Abdul Maleque
Iskandar Idris Yaacob
Zahurin Halim

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# Table of Content

**Chapter 1**
Upgrading of Laterite Ore by Reduction and Leaching

*Hadi Purwanto and Pramusanto*

**Chapter 2**
Upgrading of Iron Sand by Magnetic Concentration and Reduction

*Muta'alim, Hadi Purwanto, Nuryadi Saleh and Pramusanto*

**Chapter 3**
Microstructure and Mechanical Properties of Neutron Transmutation Doped of Silicon under Cf-252 Neutron Bombardment

*Agus Geter Edy Sutjipto, Roslan Yahya*

**Chapter 4**
Effect of Stabilizer Addition on Crystal Formation of Zirconia Synthesize From Zircon Sand

*Yuhelda Dahlan Hadi Purwanto, Nuryadi Saleh and Pramusanto*

**Chapter 5**
Upgrading of Iron-rich Laterite Ore Using Reverse Flotation

*Hadi Purwanto, Muta'alim, Yuhelda Dahlan, Nuryadi Saleh and Pramusanto*

**Chapter 6**
Influences of Additives on Copper Film Quality and Gap Filling Capability of Plating Process

*Shahjahan Mridha and Law Shao Beng*

**Chapter 7**
Grain Refining in AISI 430 Ferritic Stainless Steel Welds by Addition of Metal Powder

*Shahjahan Mridha and Muhammed Olawale Hakeem Amuda*

**Chapter 8**
Grain Refinement Practices in Ferritic Stainless Steel Welds

*Muhammed Olawale Hakeem Amuda and Shahjahan Mridha*

**Chapter 9**
Alloy Coating on Steel Surfaces by Melt Synthesis of Elemental Metal Powders

*Shahjahan Mridha*
Chapter 10
Synthesis And Characterization of Lithium Manganese Copper Oxides for use in Lithium Rechargeable Cells

I.I. Yaacob, N. Kamarulzaman, and W.J. Basirun

Chapter 11
Influence of Grain Size on Magnetic Properties of Electroplated NiFe

Yusrini Marita and Iskandar Idris Yaacob

Chapter 12
Composite Coating on Titanium Alloy Using High Power Laser

Shahjahan Mridha

Chapter 13
The Tribological Behaviour of Al-Si Automotive Piston Material

Arifuzzaman and Md Abdul Maleque

Chapter 14
Conceptual Design of Folding Bicycle Frame with Light Weight Materials

Md Abdul Maleque and Mohd Nizam

Chapter 15
Reverse Engineering of Automotive Piston

Md Abdul Maleque and A. Arifuzzaman

Chapter 16
Recent Trend in Application of High Temperature Ferritic Fe-Cr Alloys in Power Plant

Mohd Hanafi Bin Ani and Raihan Othman

Chapter 17
Measurement of Oxygen Permeability in Bulk Alloys by Internal Oxidation of Dilute Constituent

Mohd Hanafi Bin Ani and Raihan Othman

Chapter 18
Recent Trend on Application of High Temperature Ferritic Fe-Cr Alloys in Solid Oxide Fuel Cells

Mohd Hanafi Bin Ani and Raihan Othman

Chapter 19
Principle of Solid Electrolyte Oxygen Sensor

Mohd Hanafi Bin Ani and Raihan Othman

Chapter 20
Surface Oxygen Potential on the Oxide Scale during High Temperature Oxidation of Fe-Cr Alloys at 1073 K

Mohd Hanafi Bin Ani and Raihan Othman
Chapter 21
Reverse Engineering for Automotive Fuel Tank

Chapter 22
The possibility of utilizing scanning electron microscope for materials characterization

Chapter 23
Piezoelectricity of Zinc Oxide Thin film as Source of Energy for Sensor Applications

Chapter 24
Study on Zinc Oxide Crystal Growth

Chapter 25
Green Nanotechnology using SEM and AFM

Chapter 26
The effect of Cobalt addition on structural and magnetic properties of electrodeposited Iron-Platinum nanocrystalline thin films

Chapter 27
Mechanochemical Synthesis of CeO₂ Nanopowder using Planetary Ball Milling

Chapter 28
A Study on Double Junction Zinc Based/Polymer Thin Film Solar Cell

Chapter 29
A Voltammetric Study of Zinc Telluride Thin Films Prepared for Photovoltaic Applications

Chapter 30
Electrodeposition Technique for ZnO Semiconductor Thin Films Fabrication

Chapter 31
Electroless Nickel Based Coatings From Solution Containing Sodium Hypophosphite
Chapter 32
Aluminum Spray Coating for Corrosion Resistance of Steel

Chapter 33
Electrodeposition of Alloys

Chapter 34
Corrosion Behavior of Duplex Stainless Steel in Sea Water

Chapter 35
Cathodic Protection of Underground Pipes

Suryanto
Chapter 014

Conceptual Design of Folding Bicycle Frame with Light Weight Materials
Md Abdul Maleque and Mohd Nizam
Faculty of Engineering – International Islamic University Malaysia
✉️: maleque@iium.edu.my

**Keywords:** Conceptual design, Folding bicycle, Frame, Light weight materials.

**Abstract:** Light weight materials have become a popular material substitution for automotive, sports, medical, aerospace and other engineering fields due to high strength and stiffness and less energy consumption. This paper deals with conceptual design approach to develop a folding bicycle by using light weight material. A systematic and step-by-step approach of full design is presented for better understanding of the design concept of folding bicycle. The methodology of conceptual stage and evaluation systems are discussed for selecting the best concept. A total of seven (7) concepts for folding bicycle are explained. It has been found that the concept 3 is the best combination for folding bicycle frame with light weight materials.

**Introduction**
A folding bicycle or folder is a type of bicycle that incorporates hinges or joints in the frame and handlebar stem that permit it to be broken down into a more compact size [1]. The history of this folding bicycle was not very clear because so many people claimed that they are the first developers of folding bicycle. Before the automotive era arrived, the main transportation is bicycle. During World War I and World War II the military operation used folding bicycle as their important transportation in the war [2]. The less space and easy to carry make the folding bicycle the best choice. However, the bicycle at that time may be a lot different from the bicycle today in term of design, weight, folding part, size and other.

The conceptual design approach is the description of how a new design or product will work and meet its performance requirements [3]. The product is expected to satisfy a certain need, to give satisfaction to the end user, and to comply with the prevailing safety and environment laws. The total design process involves stages that are distinct and is a total sequence of design activities from market need to sale. The activities occupy such as study on market needs, conceptual design, detail design, design analysis, manufacture, prototype testing and final product. For choose the best concept among the design, the weighted objective method is used. The evaluation takes part according to significant feature or characteristic performance of the concept.