

Brahim Safi
Abdelhakim Daoui
Hamza Mechakra
Youcef Ghernouti *Editors*

Proceedings of the 4th International Symposium on Materials and Sustainable Development

Volume 2: Waste Recycling and
Environment

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on Materials and Sustainable Development

Brahim Safi · Abdelhakim Daoui ·
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Volume 2: Waste Recycling and Environment

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Brahim Safi
Faculté de Technologie
Université M'hamed Bougara Boumerdes
Boumerdès, Algeria

Abdelhakim Daoui
Université M'hamed Bougara Boumerdes
Boumerdès, Algeria

Hamza Mechakra
Université M'hamed Bougara Boumerdes
Boumerdès, Algeria

Youcef Ghernouti
Université M'hamed Bougara Boumerdes
Boumerdès, Algeria

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Preface

As part of the scientific events which took place within the M'hamed Bougara University of Boumerdes, the Research Unit: Materials, Processes and Environment of the Faculty of Technology, organizes, from 12 to 14 November 2019, the 4th International Symposium on Materials and Sustainable Development (ISMSD2019).

This scientific, technological and environmental gathering will strive to improve by trying:

1. To deepen the subject relating to nanomaterials and their incorporation in other materials.
2. To take an interest in sustainable development by focusing on renewable energies, recycling and recovery of materials, the quality of which will contribute to improving environmental protection.
3. To deepen the university–industry complementarity by multiplying the contacts between them in order to possibly bring solutions to the problems hampering the technological processes.
4. To energize the partnership, collaboration and development of relations between our university and certain foreign universities by working on joint projects to allow, among other things, our doctoral students to benefit from joint supervision and to facilitate exchanges between our students and foreign students.
5. To foster links between national researchers who will take note of the work presented by dissecting it to draw inspiration from it, as far as possible.
6. To choose the best work by rewarding the winners.

To this end, this symposium will focus on:

- Theme 1: Nanomaterials, Nanotechnology and Emerging Intelligent Materials
- Theme 2: Cementitious Materials and Material Properties
- Theme 3: Renewable Energies, Sustainable Development, Recycling and Environment
- Theme 4: Materials, Processes and Transformations

We would like to express our gratitude and appreciation for all of the reviewers who helped us maintain the high quality of manuscripts included in the proceedings published by Springer Nature. We would also like to extend our thanks to the members of the organizing team for their hard work. It is hoped that this volume will be of help to many researchers working in diverse topics present in the ISMSD2019.

It is a great privilege for us to present the proceedings of ISMSD2019 to the authors and delegates of the event. We hope that you will find it useful, exciting and inspiring.

Brahim Safi
Abdelhakim Daoui
Hamza Mechakra
Youcef Ghernouti

Objectives of the 4th International Symposium on Materials and Sustainable Development

This book presents the proceedings of the 4th International Symposium on Materials and Sustainable Development ISMSD2019 (CIMDD2019) that was held during 3-day (12–14 November) and organized by the Research Unit: Materials, Processes and Environment and M'hamed Bougara University of Boumerdes (Algeria) in partnership with University of Reims - Champagne-Ardenne (France). This symposium follows the success of CIMDD 2013-2015-2017 and continues the traditions of the highly successful series of international conferences on the materials, processes and environment. The symposium will provide a unique topical forum to share the latest results of the materials and sustainable development research in Algeria and worldwide.

Organization

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Organization

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Contents

Physicochemical and Foaming Properties of Crude Acid Whey Treated by Ultrafiltration	1
K. Acem, C. Fersi, and A. Yahia	
CoSoTIA Project: Decision Support for the Choice of Concentrated Solar Technologies for Electricity Generation	12
M. Aissani, K. Mohammedi, A. Zitouni, M. Boukraa, T. Chekifi, and A. Mehiris	
Mechanical Strength Analysis and Damage Appraisal in Carbon/Perlon/Epoxy Composite for Orthopedic Prostheses	23
L. Alimi, Y. Menail, K. Chaoui, K. Kechout, S. Mabrouk, N. Zeghib, A. Belhamzaoui, N. Metrane, and K. Bedoud	
Study of the Mechanical Properties of the Sand Concrete Lightened by Lignocellulosic Materials	34
B. Belhadj, A. Goullieux, M. Bederina, N. Montrelay, and M. Quéneudec	
Physical and Mechanical Properties of Concrete Containing PVC Waste as Aggregate	48
M. Belmokaddem, A. Mahi, Y. Senhadji, and B. Y. Pekmezci	
A Statistical Analysis of Size, Shape and Tensile Properties of Fibres Extracted from Date Palm (<i>Phoenix Dactylifera L.</i>) Rachis	57
H. Boumediri, A. Bezazi, G. Garcia del Pino, B. Bezzazi, A. Toufik Moussai, F. Scarpa, and A. Dufresne	
Study of the Mechanical Behavior of a Reactive Powder Concrete Containing Fibers	71
M. Chadli, N. Tebbal, and M. Mellas	
Effect of Initial Suction on the Hydraulic Properties of an Algerian Waste Landfill Lining	83
A. Demdoun, H. Souli, R. Anlauf, E. G. Daheur, and I. Goual	

Hydromechanical Properties of a Leachate Contaminated Tuff/Sandy Soil/Bentonite Mixture	93
A. Demdoun, H. Souli, R. Anlauf, H. Loualbia, and M. K. Gueddouda	
Biosurfactants Production from Newly Isolated <i>Aspergillus sp.</i> FS11 Using Agro-Industrial Wastes	115
L. Derguine-Mecheri and S. Kebbouche-Gana	
Analyses of the Micromechanics of Stress Transfer in Single Fiber Pull-Out Tests	128
Fatiha Teklal, Bachir Kacimi, and Arezki Djebbar	
Effect of Reinforcement Shear and Buckles Defects on the Low Velocity Impact Behavior of a Composite	136
B. Kacimi, F. Teklal, and A. Djebbar	
Reinforcement of Building Plaster with Plastic Waste and Glass Powder	145
S. Kennouche, H. Abdelli, B. Amrane, and B. Hami	
Compliance with RPA of an Old Building	152
R. Madi, A. Bordjiba, and M. Guenfoud	
Study of Physico-Mechanical Characteristics of Concrete Made with Recycled Gravel and Prepared Sand	163
B. Mehsas, A. Noui, L. Belagraa, and S. Slimani	
Behavior of Concrete Using Coal Waste (Heap) in Hot Weather	175
M. Miloudi and M. Merbouh	
Influence of Nitrogen Partial Pressure on the Structural, and Mechanical Properties of Ti-N Thin Films	187
F. Salhi, L. Aissani, C. Nouveau, and A. Alhussein	
Author Index	197