

## Preface

International Symposium on Advanced Materials (ISAM) has gained respect in the scientific community with consistent hard work of its organizers for more than thirty years. This is the sixteenth event in its series of biennial symposia.

The objective of publishing this proceeding is to record, acknowledge, and share the cherished contribution made by the symposium participants. This book contains valuable scientific and technological data, which could be helpful for ongoing research all around the globe in general and in Pakistan specifically.

This volume contains forty-eight peer-reviewed papers selected from more than 200 presentations made at the forum of ISAM by the local and foreign speakers. The participation and scientific knowledge sharing of all the attendees is highly appreciated. Reviewing the paper is a appreciable job heavily relying on the goodwill of experts of related fields. The contribution of reviewers is highly praised by the ISAM organizers.

In this proceeding several interdisciplinary topics have been discussed, ranging from alloys and their processing, polymers and composites, biomaterials to nanomaterials, and nanotechnology. Similarly, a handsome number of applications of these advanced materials have also been highlighted in the text of proceeding.

As a secretary, I feel satisfied with the successful completion of the event by publishing the proceeding. The efforts of technical committee are highly acknowledged for preparation of proceeding.

The proceeding will be available online in Key Engineering Materials, a publication of Trans Tech Publications Ltd (TTP). I would like to thank TTP team for accepting our proceeding for publication. The cooperation of TTP is appreciable especially during the difficult time of COVID-19.

I am thankful to the chairman of the symposium, for extending his guidance and support during the course of ISAM 2019, without which this international event was not possible.

I owe special thanks to each member of all working committees, sponsors, and co-organizers of ISAM-2019 for their evident and veiled contribution at any level to make the symposium a memorable event.



Dr. M. Muneeb Asim  
Secretary Symposium

# ISAM 2019 Committees

## Organization Committee

Tahir Ikram	Chairman
Muhammad Muneeb Asim	Secretary
Amjad Ali	Treasurer
Syed Willayat Hussain	
Hamid Zaigham	
Sara Qaisar	
Iftikhar us Salam	
Zubair Ahmed	
Muhammad Shoaib	
Shabbar Abbas Rizvi	
Aamir Nusair	
Tayyab Subhani	

## Secretariat Committee

Amjad Ali  
Rehan Qayyum  
Shahab Bhatti  
Mohsin Abbas

## Technical Committee

Mustasim Billah Bhatti  
Muhammad Mansoor  
Noveed Ejaz  
Ahnaf Usman Zillohu  
Hamid Nawaz

## Co-Organizers

National Center for Physics, Pakistan  
Institute of Space Technology, Pakistan

## Sponsors

ENAR, Pakistan  
Peoples Steel Mills Ltd, Pakistan  
Engineering Horizons, Pakistan  
Chenab Engineering, Pakistan

Analytical Measuring Systems, Pakistan  
Sowan Enterprises, Pakistan  
Ibne-Sina institute of Technology, Pakistan  
ALCO Valves, Pakistan