

# PREFACE

The 4<sup>th</sup> International Conference on “Smart Materials, Structures and Systems” was held in Montecatini Terme, Italy on June 10-14, 2012 following the previous Symposia on the same topic which were held in Florence in 1994 and 1998 and in Acireale (Sicily) in 2008.

Taking into account the increasing relevance of the field, it was decided to organise again this 4<sup>th</sup> edition in the form of a separate “Junior” CIMTEC conference structured in several Symposia and Focused Sessions.

Indeed, the intensive research carried out world wide for creating higher forms of materials, structures and systems by providing them with “life” functions, resulted already in a high level of technology readiness with several applications now emerging, which demonstrate smart materials technologies to have matured well beyond the conceptual stage. Widespread use of nanotechnology concepts and tools and the availability of multiscale computational models coupled with the exponential growth of computer capability are fuelling the rate of advancement of the field. This also is increasingly taking advantage from the merging of materials science and engineering from information deriving from a deeper understanding of biological processes and from the highly effective evolutionary solutions created by nature along million years.

About 800 papers have been presented at the ten Symposia and several Focused and Special Sessions included in the conference by authors from over 50 countries with substantial participation from overseas countries. Particularly numerous were the delegates from the Americas and Australasia.

The 10 volumes of the Conference Proceedings collect a selection of the papers presented.

Volume 1 - Adaptive, Active and Multifunctional Smart Materials Systems (co-edited by Yoon-Bong Hahn, Salvatore Iannotta, Andreas Lendlein, Vincenzo Palermo, Shashi Paul, Concita Sibilia, S. Ravi P. Silva, Gopalan Srinivasan)

Volume 2 - State-of-the-Art Research and Application of SMAs Technologies (co-edited by Stefano Besseghini, Shuichi Miyazaki, Eckhard Quandt and Minoru Taya)

Volume 3 - Electroactive Polymers: Advances in Materials and Devices (co-edited by Steen Skaarup)

Volume 4 - Smart and Interactive Textiles (co-edited by Cosimo Carfagna)

Volume 5 - New Generation Micro/Nano Systems (co-edited by Leandro Lorenzelli)

Volume 6 - Smart & Adaptive Optics (co-edited by Maurizio Ferrari and Giancarlo Righini)

Volume 7 - Embodying Intelligence in Structures and Integrated Systems (co-edited by Fabio Casciati and Piervincenzo Rizzo)

Volume 8 - Mining Smartness from Nature (co-edited by Luca Schenato, Nadrian C. Seeman and Friedrich C. Simmel)

Volume 9 - Wearable/Wireless Body Sensor Networks for Healthcare Applications (co-edited by Dermot Diamond)

Volume 10 - Biomedical Applications of Smart Technologies (co-edited by E. Pasquale Scilingo)

The Editor, General Chair of CIMTEC Conferences, would like to express his great appreciation to all the institutions and professional organisations involved in the Conference, to the members of the International Advisory Boards, to Symposia and Focused and Special Sessions Co-Chairs and Coordinators, to Plenary and Invited Lecturers and to all other participants who contributed by fostering progress in the field to the great outcome of the Conference.

PIETRO VINCENZINI  
Conference Chair  
Proceedings Editor

# SYMPOSIUM H – Mining Smartness from Nature

*General Chair CIMTEC Conferences*

Pietro VINCENZINI, *Italy*

*Symposium Co-Chairs*

Takuzo AIDA, *Japan*; ZhenDong DAI, *China*; George JERONIMIDIS, *UK*; Nadrian C. SEEMAN, *USA*

*Programme Chairs*

Nadrian C. SEEMAN, *USA*

Friedrich C. SIMMEL, *Germany*

*Special Session H-7 Programme Chair*

Luca SCHENATO, *Italy*

*Members*

Robert ALLEN, *UK* Martyn AMOS, *UK* Bharat BHUSHAN, *USA* Vincent BULONE, *Sweden*  
Jerome CASAS, *France* Wei CHEN, *P.R.China* Mihai CHIRITA, *Romania* Paolo DARIO, *Italy*  
Dennis E. DISCHER, *USA* Manuel ELICES, *Spain* Peter FRATZL, *Germany* Giuseppina GINI, *Italy*  
Stanislav N. GORB, *Germany* Yuichi HIRATSUKA, *Japan* Shigeyuki HOSOE, *Japan* Eric JAKOBSSON, *USA* Pasi KALLIO, *Finland* Satoshi KOBAYASHI, *Japan* Sunghoon KWON, *Korea* Akhlesh LAKHTAKIA, *USA* Hao LIU, *Japan* Sylvain MARTEL, *Canada* Raul J. MARTIN-PALMA, *Spain* Constantinos MAVROIDIS, *USA* Fiona MELDRUM, *UK* Carlo MENON, *Canada* Phillip B. MESSERSMITH, *USA* Tsafrir MOR, *USA* Christof M. NIEMEYER, *Germany* Gerald POLLACK, *USA* Yasubumi SAKAKIBARA, *Japan* Mehmet SARIKAYA, *USA* Mitsuhiro SHIONOYA, *Japan* Friedrich C. SIMMEL, *Germany* Uwe B. SLEYTR, *Austria* Lloyd SMITH, *USA* Christina D. SMOLKE, *USA* Shigeru SUNADA, *Japan* Andrew J. TURBERFIELD, *UK* Reidun TWAROCK, *UK* Julian VINCENT, *UK* Joseph WANG, *USA* Daniel WEIHS, *Israel* Marc WEISSBURG, *USA* Itamar WILLNER, *Israel* Hao YAN, *USA* Byoung-Tak ZHANG, *Korea* Di ZHANG, *P.R.China*