

# Preface

This book comprises contributions of the first PAMS workshop that was organized at the Ecole de Physique des Houches (France), in May 2014. This workshop has brought together a number of leading scientists working on various strategies to synthesize and study single molecules, 1D and 2D covalently bonded molecular architectures obtained by on-surface synthesis.

PAMS (for planar atomic and molecular scale devices) is a four-year large-scale integrating project funded by the European Commission's FET programme. It was launched in October 2013 with the objective to explore all scientific and technological aspects of the conception and the fabrication of planar atomic and molecular scale electronic devices on Si:H, Ge:H, AlN, CaCO<sub>3</sub> and CaF<sub>2</sub> surfaces, fabricated with atomic scale precision and reproducibility. The themes described in this volume have huge potential for the in situ preparation of large molecular logic gates and high-conductance molecular wires by on-surface synthesis, in ultra-clean environment as explored by the PAMS chemists, physicists and theoreticians.

In less than a decade, on-surface synthesis by covalent coupling of reactive precursors adsorbed on metallic, semiconducting or insulating surfaces has emerged as a powerful approach for the fabrication of novel molecular architectures with potential applications in nanoelectronics, optoelectronics and other fields where new low-dimensional materials with tailored properties are needed. Using this bottom-up route, atomically precise graphene nanoribbons, polyphthalocyanines films, metal coordination frameworks, porous metal networks, superhoneycomb frameworks, etc., have been synthesized. And it must be emphasized that most of these large molecular structures cannot be synthesized by standard in-solution syntheses.

The aim of this book is to regroup contributions at the forefront of advances in this very active field, focusing on the understanding of inter- or intramolecular chemical coupling mechanisms, on new reactions, on new substrates and on optimization of reactions.

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### On-Surface Synthesis

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