

PREFACE

This volume represents the first of a series of proceedings of the EL.B.A. Forum on Bioelectronics, a scientific discipline at the frontiers of Advanced Electronics and Biotechnology.

The name for these forums derives not only from the place (the Isle of Elba in Italy), where the conferences have been held every 6 months since 1991, but also from an acronym: **Electronics and Biotechnology Advanced**.

Bioelectronics is intended as *"the use of biological materials and biological architectures for information processing and sensing systems and devices down to molecular level"* and focuses its attention on three major areas:

I New hardware architectures borrowed from the thorough study of brain and sensory systems down to the molecular level, utilizing existing semiconductor inorganic materials (both GaAs and Si) and giga-scale integration;

II Protein Engineering, especially of systems involved in electron transfer and molecular recognition, integrated with Metabolism and Chemical Engineering, to develop new biomaterials by learning basic rules of macromolecular folding and self-assembly;

III Sensors, thin film and electronic devices utilizing organic compounds and biopolymers, and by implementing nanotechnology bottom up through manufacturing and characterization at the atomic level.

Bioelectronics, at the interface of biotechnology and electronics, has been characterized by the Italian Government, as early as 1989, as one of the fields of strategic importance for scientific and technological research and for potential industrial development. The decision, made in 1989 by the Italian Government, was revolutionary in this field in that for the first time in a National Program of Research scientific activity was combined with training-by-research of young scientists. For the first time, provisions were made for an eight-year plan divided into two periods, one of three and the subsequent of five years duration.

As a result, in 1990 several companies (SGS Thomson, Pharmacia-Farmitalia Carlo Erba, Elsag Bailey, Sorin Biomedica-FIAT, ENICHEM) and an industrial consortium (Technobiochip, recently transformed in a new company operating in the field of Bioelectronics, and a major sponsor of the EL.B.A. Forum), all leaders in their fields at the international level, became involved in the research activity sponsored by the National Program of Research "Technologies for Bioelectronics," under the general cover of CIREF.

Extremely significant was the formation, in 1990, of Polo Nazionale Bioelettronica, a consortium with headquarters in the Isle of Elba, that is comprised of several leading universities (Genoa, Pisa, Siena, Naples, Catania), national research institutions (ENEA, INBB, National Institute of Health), industrial consortia TECHNOBIOCHIP, CIREF), and financial holding companies (Raggio di Sole Biotechnologie, IRI-SPI).

One of the milestones in the development of the international cooperation in the fields relevant for bioelectronics was set up by the signing of an international agreement between

Italy and Russia in December 1990. This agreement, signed by Italian Minister Ruberti and Russian Vice-Minister Bortnik, for cooperation in the fields of Biomolecular Engineering and Bioelectronics, resulted in the "Elba Project" between the Russian Academy of Sciences and Polo Nazionale Bioelettronica. As the result of this project a foundation has been established recently involving Polo Nazionale Bioelettronica, the Italian Ministry of Foreign Affairs, the Italian Ministry of University and Scientific and Technological Research, the Russian Ministry of Science and Technical Policy, leading research institutions from Italy, Russia, and the United States, with the participation of the Commission of European Union as an observer.

More recently, the same island and acronym (Electronics and Biotechnology Advanced), have given the name to a Scientific and Technological Park, which is becoming a key location of an expanding scientific and technological project of European dimensions focused on Bioelectronics.

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