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Preface

In 1990, the Interdivisional Group of Catalysis and the Division of Industrial Chemistry of the Italian Chemical Society initiated a series of bi-annual seminars on catalysis with the aim to provide a substantial tool for young graduates engaged in research activities in several fields of catalysis. The titles of seminars held or scheduled are as follows: Seminar I, 28 October–2 November 1990, 11 Ciocco (Lucca), “Introduction to heterogeneous catalysis”; Seminar II, 7–12 June 1992, Tirrenia (Pisa), “Homogeneous, polymerization, asymmetric and enzymatic catalysis”; Seminar III, 19–24 June 1994, Rimini, “The catalytic process from laboratory to the industrial plant”; Seminar IV, 16–21 June 1996, Pracatinat (Torino), “Materials design for catalytic application”; and Seminar V, 8–12 June 1998, Villasimius (Cagliari), “Kinetics and modelling of catalytic reactions: from laboratory to industrial reactor”.

After the first seminar, in which a general overview on heterogeneous catalysis was given, a particular theme was treated and developed in each of the following seminars; in the second seminar, the focus was on homogeneous catalysis, while in the third seminar, an exhaustive review was given of the activities and the information required to develop laboratory achievements into an industrial plant and therefore to generate a catalytic process. The 1996 seminar concentrated on materials, as reflected by the title: “Materials design for catalytic application”; a wide range of inorganic and organic materials was considered and described in terms of preparation method, structural characterization and the relationship between the structure of the active sites and the catalytic properties. The most powerful physical–chemical techniques applied to determine material prop-

erties were reported with several examples of application.

Why to devote a seminar to materials design? In the early stages of the development of technologies and scientific knowledge on heterogeneous catalysis, catalytic systems were discovered and developed essentially through a trial and error approach. A patient and systematic study of many potential catalytic systems led to many industrial processes and to the acquisition of information from which some general models of reaction mechanisms were derived. On the other hand, the development of new physico-chemical techniques and the growth of surface science generated new tools to improve the knowledge on the structure of catalysts and reaction mechanisms. We are still far from being capable to predict, *a priori*, a new catalyst for a desired application and the Edisonian approach again plays an important role in catalyst manufacture; nevertheless, the dream to predict, design and build a molecularly engineered catalyst for a required application is less distant than it was. In following this route, the properties of materials and materials science in general will play an important role. The evolution of industry needs requires a greater sophistication in industrial catalytic systems: cost reduction and environmental concerns are the driving forces to improve catalytic activities as well as the selectivities in refinery and petrochemistry processes while improved selectivities towards complex molecules as well as cost cuts are the major achievements to be expected in fine chemistry. The sophistication of active sites on inorganic catalysts is being improved in order to provide better performances.

In the fourth seminar on catalysis, we tried to transmit the flavor of this evolution together with

the basic knowledge on the most common classes of catalysts. The collection of lectures reported in this issue of *Catalysis Today* is mainly addressed to young graduates but it will also be of interest to everyone approaching studies on heterogeneous catalyst preparation and characterization. The publication of the

lectures is aimed to provide guidelines, reviews and exhaustive references as well as showing the evolutionary trends of the disciplines considered.

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