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Circumstellar and Interstellar PAHs: A Laboratory Study -- Confirmation of C60 in the Reflection Nebula NGC 7023 -- The Spitzer Surveys of the Small Magellanic Cloud: Insights into the Life-Cycle of Polycyclic Aromatic Hydrocarbons -- PAH-related Very Small Grains in Photodissociation Regions: Implications from Molecular Simulations -- The Formation of Benzene in Dense Environments -- Experimental Studies of the Dissociative Recombination Processes for the C6D+6 and C6D+7 Ions -- VUV Photochemistry of PAHs Trapped in Interstellar Water Ice -- PAHs in Regions of Planet Formation -- Observations of Hydrocarbon Emission in Disks Around Young Stars -- Evolution of PAHs in Protoplanetary Disks -- PAH in Vectorized Three Dimensional Monte Carlo Dust Radiative Transfer Models -- PAHs and Carbonaceous Grains & Solar System Materials -- From PAHs to Solid Carbon -- PAHs and Astrobiology -- Solid State Molecular Reactors in Space -- Polycyclic Aromatic Hydrocarbons and the Extinction Curve -- The Diffuse Interstellar Bands in History and in the UV -- The PAH-DIB Hypothesis -- Electronic Spectroscopy of PAHs -- Spectroscopy of Protonated and Deprotonated PAHs -- Observations of Interstellar Carbon Compounds -- Interaction of Atomic Hydrogen with Carbon Grains -- Near-Infrared Spectroscopy of Interstellar Dust -- Atypical Dust Species in the Ejecta of Classical Novae -- The Role of PAHs in the Interstellar Medium -- The Role of PAHs in the Physics of the Interstellar Medium -- PAHs and the Chemistry of the ISM -- [FePAH]+ Complexes and [FexPAHy]+ Clusters in the Interstellar Medium: Stability and Spectroscopy -- Modelling the Physical and Chemical Evolution of PAHs and PAH-related Species in Astrophysical Environments -- Superhydrogenated PAHs: Catalytic Formation of H2 -- Summary of the Meeting -- Summary of the Meeting -- Author Index -- Astronomical Object Index -- Chemical Compound Index -- Subject Index -- EAS Publications Series

Sommario/riassunto

Driven by ground-based, airborne, and IRAS observations, the PAH hypothesis was first formulated in the mid-eighties : the widespreas emission features in the 3-13 µm range are due to UV-pumped, IR fluorescence by large Polycyclic Aromatic Hydrocarbon molecules. These molecules are a ubiquitous component of the insterstellar medium both in local galaxies as well as out to redshifts of ~3 and probably beyond, play an important role in its physical and chemical characteristics, and form a key link between small hydrocarbon species and large carbonaceous grains. This book gathers contributions that reflect the evolution of the field over the last 25 years, taking advantage of IR space missions - ISO, Spitzer and AKARI - and of dedicated experimental and quantum-chemical studies. We have now reached a stage where we can develop these mid-infrared features as diagnostic tools to study star formation processes, protoplanetary disks as well as galaxy assemblage in the early Universe. The current Herschel/Planck area opens the possibility to better characterize the mid-IR carriers through their contribution to the far-IR and mm emissions. Still, much effort is required before we will fully understand the formation and nature of interstellar PAHs and their role in the Universe. Physical chemists can play an important role in driving this field. This book aims at discussing the state-of-the-art of the PAH hypothesis and to chart the future in this interdisciplinary field. It highlights the various aspects of interstellar PAHs: - Rich IR spectra of interstellar PAHs - PAHs and star formation in the near and far Universe - The lifecycle of PAHs in space - PAHs in regions of planet formation - PAHs and carbonaceous grains & Solar system materials.

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