Preface

The space between stars is not empty, but filled with interstellar matter, mostly composed of atomic, ionized or molecular hydrogen, depending on the temperature and density of the various phases of this medium. About 1% of the total mass of interstellar matter in our galaxy is contained in small solid particles, ranging in size from a few nanometers to many microns and even millimeters in planet-forming disks around young stars. This cosmic dust undergoes a complicated lifecycle, with fresh material produced in the outflows of evolved stars and supernovae, modified by shocks and cosmic rays in the diffuse interstellar medium and provding the surface for the formation of molecular ices in cold and relatively dense molecular clouds.

Although elemental abundances, formation routes, extinction curves, and early infrared and ultraviolet spectroscopy pointed to the presence of silicates, carbides, and graphitic material in space, it was only recently determined that a new field – astromineralogy – emerged from astronomical observations. The unprecedented spectral resolution and wavelength coverage provided by the *Infrared Space Observatory*, together with dedicated experimental work in the field of laboratory astrophysics, provided the unambiguous identification of minerals in space, ranging from olivines and pyroxenes to various carbides.

Cosmic mineralogy already provided earlier results on minerals in space by the in situ study of minerals in our solar system. Meanwhile, we see a bridge between astronomically-identified minerals and stardust minerals found by their isotopic signatures in meteorites and interplanetary dust. This may lead to a wider definition of astromineralogy that includes these investigations.

Early seminars on astromineralogy were held at the Universities of Amsterdam and Heidelberg. They showed the large interest of astronomers, physicists, chemists, and mineralogists in this new field and encouraged the publication of this book. New infrared missions such as SIRTF and NGST will provide more empirical material in this fascinating field.

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