

Microscope for Life-signature Detection in Venus Cloud

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The sulfuric acid is not sufficient to explain the observed albedo and cloud contrasts of the planet Venus, although Venus clouds consist of droplets of 75-85% sulfuric acidic-water [1]. Proposal of the contribution of other chemical species involved in the absorption has been indicated [2]. The presence of active volcanos suggested on Venus, [3] and the possible existence of the past liquid water, evolution and emergence of thermophilic or sulfur-metabolizing bacteria have been postulated [4]. The temperature and pressure are moderate several tens km above surface on Venus, although the planet surface is too extreme for living organism and organic compound to survive. The presence of microorganisms is suspected in the clouds [4] that might contribute to the spectroscopic characteristics. Life-signature detection instruments will, therefore, be useful for the missions on astrobiology with aerial platforms. A Life-signature Detection Microscope (LDM) have been developed to obtain visible images of particles and to search for the life signature including possible "cells" in the Venus cloud samples. A pigment system has also been designed to distinguish abiotic organic compounds from biotic ones. The pigments are now being tested to function under the acidic conditions similar to the Venus cloud environment. The system can detect both organic compounds surrounded by membrane representing "cells", and metabolism in the typical cells of terrestrial life [5] [6]. The system resolution of 1 micrometer/pixel fulfills the requirements for the observation of almost all terrestrial microbes. The proposed LDM system fit for Aerial platforms such as Venus Atmospheric Mobile Platform [7] to analyze the aerosol.

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