PRESS RELEASE

Sardinia in space

A new patent has been filed for human space exploration

UNISS, UNICA, CRS4, DASS and TOLO Green for the advancement of research in astrobiology

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The University of Sassari, the CRS4 – Center for Advanced Studies, Research and Development in Sardinia, the Sardinia AeroSpace District (DASS), the University of Cagliari and the Tolo Green company have filed the application for a new patent that will help to broaden research activities in the field of astrobiology towards a future where Mars might be reached by humans. This is precisely the scenario outlined by DASS as part of the mission "Sardinia in space".

A team effort

The news was communicated during a press conference attended by the Rector of the University of Sassari Gavino Mariotti, the sole administrator of CRS4 and President of DASS Giacomo Cao, the President and founder of TOLO Green Gilberto Gabrielli, professor Antonella Pantaleo of the University of Sassari and the PhD student Alessia Manca, the CRS4' researcher Alessandro Concas and the PhD student of the University of Cagliari Giacomo Fais. TOLO Green, engaged in the renewable energy sector, is the first Italian producer of the microalga *spirulina platensis*.

Spirulina grows in the absence of gravity and oxygen

Thanks to a long and patient teamwork that involved professors, researchers and doctoral students from the company, universities and research institutions involved, it was possible to develop a specific growth medium suitable for spirulina algae, the new "green gold", under extraterrestrial living conditions. At almost zero gravity, reached by means of a specific tool called clinostat, suitably equipped to simulate the Martian atmosphere, the alga supplied by the company TOLO Green located in Oristano, grows quite well as shown during the experiments conducted by the research group of professor Antonella Pantaleo of the Department of Biomedical Sciences of the University of Sassari. Since 2006, CRS4 and the University of Cagliari, as well as other members of DASS, have been conducting, under the guidance of Professor Giacomo Cao, important research on microalgae that will give the possibility to reach and survive on the red planet. In fact, spirulina algae can serve the dual purpose of feeding astronauts and generating oxygen in an extraterrestrial environment, using the CO2 saturated Martian atmosphere.

The patent

The patent objective is represented by a kit consisting of a clinostat and a chamber with a CO_2 atmosphere, which can reproduce extraterrestrial conditions such as the Martian ones. The purpose of this tool is to perform the growth of microalgae under zero gravity conditions, as well as to evaluate the corresponding behavior of human, vegetable and animal cells even under simulated Martian atmosphere. Furthermore, the innovative cultivation process is also the subject of the patent and allows the improvement of a system already patented in the past. The innovation would allow the limitation of the material to be transported on the Earth-Mars journey using in-situ available elements such as atmospheric CO_2, Martian soil and the urine of astronauts to sustain manned missions on the red planet. In fact, using such resources it would be

possible to grow algae on Mars useful both for the production of oxygen and as supplement food for astronauts.

Giacomo Cao- "It is a reason of great satisfaction to follow up, through the filing of this patent, the concept repeatedly emphasized of synergy between the scientific-technological sector and the entrepreneurship one, represented by TOLO Green - says Giacomo Cao, Sole Administrator of CRS4 and Chairman of DASS board of directors - The studies carried out show once again that Sardinia can play an important and significant role in the aerospace sector, not only for the development of new technologies but also for attracting important private investments in the sector". Cao concludes: "I think it is important to underline that future robotic and human missions on extraterrestrial bodies can represent a significant advancement to extract suitable resources, such as rare earths used for the production of microchips, which are scarce on Earth".

Gavino Mariotti- "All the experiments of the Department of Biomedical Sciences of the University of Sassari are giving positive results and allow one to foreseen important steps forward in the sector - declares Rector Gavino Mariotti - For us it is a reason of pride to be able to contribute with our scientific skills to the growth of the territory, especially if we can do it together with other institutions, research centers and leading companies in the Sardinian industrial environment. Here, it is then right to remember professor Proto Pippia, a pioneer of research in astrobiology within our University. He is responsible for the availability in our laboratories of state-of-the-art equipment such as the clinostat, which is in fact essential because all the experiments that are giving promising results are taking place here in Sassari". The clinostat model present at the University of Sassari is unique in Italy.

Gilberto Gabrielli "The collaboration between CRS4 and TOLO Green was born two years ago and is the result of a convergence of scientific and production interests. Each with its specific characteristics and strategic missions, has generated the opportunity that we acknowledge today and that we would like, we must, develop also in the future - declared Gilberto Gabrielli of TOLO Green - Today TOLO Green is at the EXPO in Dubai as one of the most interesting representations of Italian innovative technologies, biological and the microalgae sector, present in the world of the United Arab Emirates. With CRS4, with professor Cao, we take the opportunity to start the biological path for space and its exploration in the combination of our capabilities, and to define an innovative standard on the long-term sustainability of biological use under extreme conditions".

Francesco Mola- "I regret I was not able to participate at this morning's press conference, because I was busy with the celebration of the 400th anniversary of our University - declares Francesco Mola, Rector of the University of Cagliari - Born at the Interdepartmental Center for Engineering and Environmental Sciences (CINSA) of our university, today's initiative is intertwined with a double thread of the most innovative scientific research, carried out for some time by several teams of our researchers. For our part, we greatly appreciate the activities conducted by the group coordinated by professor Cao in the aerospace sector, together with the reaffirmation of the need for teamwork at the territorial level with the University of Sassari, the Aerospace District and CRS4, and with the contribution of leading companies in the sector such as Tolo Green".

Media Contacts
Greca Meloni, CRS4's Head of Press Office- email: greca.meloni@crs4.it - phone: +393472152650
Valentina Guido, University of Sassari's Head of Press Office- email: vlguido.uniss.it – phone: +393666134083