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Precious Metals in Space

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Since ancient times and to this day precious metals are known to mankind as the most precious metals. To it the products found in ancient burials, which remained up to now testify.

A precious metal is a rare, naturally occurring metallic chemical element of high economic value. Chemically, the precious metals tend to be less reactive than most elements. They are usually ductile and have a high lustre. Historically, precious metals were important as currency but are now regarded mainly as investment and industrial commodities. Precious metals it is such metals as gold, silver, platinum, and palladium [1].

Based on known terrestrial reserves and growing consumption in developing countries along with excessive exploitation by developed countries, there is speculation that key elements needed for modern industry and food production, including phosphorus, antimony, zinc, tin, silver, lead, indium, gold, and copper, could be exhausted on Earth within 50–60 years. In response, it has been suggested that platinum, cobalt and other valuable elements from asteroids may be mined and sent to Earth for profit [2].

Now many American companies and scientists try to learn about asteroids more and more.

Such, for example, a US company has unveiled plans to launch a fleet of spacecraft to hunt for small asteroids that pass close to Earth which might one day be mined for their precious resources.

Deep Space Industries aims to fly a series of low cost prospecting satellites in 2015 on missions of two to six months, with larger spacecraft embarking on round-trips to collect material a year later.

Asteroids vary in their compositions but some are rich in the platinum group materials and other highly valued metals. Some asteroids are largely made from nickel-iron alloys [3].

According to data BBC News Online: “The most detailed study of an asteroid shows that it contains precious metals worth at least $20,000bn.”

The data were collected last December by the Near Earth Asteroid Rendezvous (Near) spacecraft which passed close to the asteroid Eros.

Over a thousand images of Eros were transmitted back to Earth that allowed scientists to estimate its size and mass. The results are startling, In the 2,900 cubic kms of Eros, there is more aluminium, gold, silver, zinc and other base and precious metals than have ever been excavated in history or indeed, could ever be excavated from the upper layers of the Earth's crust [4].

Today, mining in space is moving from science fiction to commercial reality but metals magnates on this planet need not fear a mountain of extraterrestrial supply - the aim is to fuel human voyages deeper into the galaxy.

Also, Wall Street research firm Bernstein notes that a big asteroid called 16 Psyche, in the asteroid belt between Mars and Jupiter and measuring some 200 km (130 miles) across, may contain 17 million billion tons of nickel-iron - enough to satisfy mankind's current demand for millions of years. But costs and technical hurdles rule out hauling resources down to Earth in the foreseeable future, experts say.

"It's ridiculous to believe that asteroid resources will ever compete with terrestrial alternatives and Earth markets," said Brad Blair, [5] a mining engineer and economist and a General Partner with NewSpace Analytics LLC in Idaho Springs, Colorado. He is a professional consultant on advanced mining technology, the economic use of space mineral resources, and the analysis and modeling of emerging space market opportunities [6].

In turn, the company's principals--which include X-Prize Foundation founder Peter Diamandis, Space Adventures co-founder Eric Anderson, and former NASA Flight Director Chris Lewicki- pledged that Planetary Resources would make the abundant resources of space available here on Earth, and introduced a couple of the company's own spacecraft that will make such space prospecting possible. The rush for space resources is officially on.

The company unveiled designs for two new spacecraft it intends to deploy in the relatively near term--the Arkyd Series 100 Leo Space Telescope and the Arkyd Series 200 Interceptor--the former being slated for launch within the next two years. Further robotic spacecraft will be developed to evaluate asteroids for their water and mineral content and to eventually mine and perhaps relocate them to orbits more amenable to mining.

Most importantly, Planetary Resources plans to do all this on the cheap. The first Arkyd Series 100 telescopes are expected to be relatively inexpensive, on the order of $10 million dollars each, and will hitch rides to low earth orbit aboard existing satellite launches. And the company's philosophy is centered on opening up deep space and the asteroids that live there to exploration while keeping the company's value proposition intact.

Doing so is not going to be easy, but it does have its economic allure. As, the asteroid with a diameter of 1600 foots is rich in platinum group metals--things like rhodium, palladium, osmium, iridium, and platinum itself--could yield the equivalent of all the platinum group metals ever mined on Earth, the company says.

As such, initial exploration will focus on water-rich asteroids, as Planetary Resources appears to view its goal of establishing a means to harvest and supply water in space to be of equal importance to extracting precious metals. The H2O will serve as a crucial enabler to further deep space exploration, and a linchpin in the in-space infrastructure Planetary Resources hopes to install at points beyond low earth orbit.

If Planetary Resources manages to do half of what it aims to do over the next decade or so, that it will be valid the greatest break in studying of space [7].

Thus, today it isn't clear yet when technologies of our time are able to lower resources of asteroids to Earth. But we will be, hopes that this day will come soon, after all it is important for us, as well as in development of science of space exploration, and in the vital purposes.

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Insulation Systems in Spacecraft

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Nowadays, it is impossible to imagine a spacecraft without thermal protection and control system. Spaceship equipment is not capable to work in outer space without this system. Multi-layer protection system is widely used in practice. Also aerogel is a promising insulating material for spacecraft. These two materials will be discussed in the article.

Multi-layer insulation(MLI) is thermal insulation composed of multiple layers of thin sheets and is often used on spacecraft. It is one of the main items of the spacecraft thermal design, primarily intended to reduce heat loss by thermal radiation. In its basic form, it does not appreciably insulate against other thermal losses such as heat conduction or convection. It is therefore commonly used on satellitesand other applications in vacuum where conduction and convection are much less significant and radiation dominates. Typical structure of MLI is shown on figure 1.

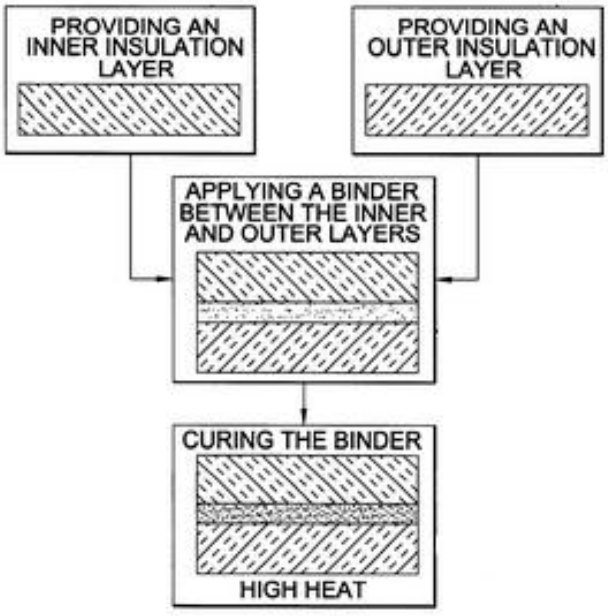

Figure 1 - Typical Multi-layer Insulation structure

Multi layer insulation materials consist of lightweight reflective films assembled in many thin layers. These layers are typically made of polyimide and/or polyester films (according to design,