ABSTRACT
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**Title of Paper**
Another Age of Discovery in Solar System through Solar Sailing

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Another Age of Discovery in Solar System through Solar Sailing

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Abstract

Solar Sails had been conceived as what comes next in space exploration. It enables fuel free flight and ultimate in a sense, if longer flight periods are allowed. It represents the cutting-technology, and the world had awaited for it to appear. Japan Aerospace Exploration agency (JAXA) launched the world's first solar sail craft, Ikaros in 2010 and solar sailors have appeared.

Outer solar system intrigues everyone’s concern especially since it presents something unknown and potential to us. Space mineral resources are well found for asteroids. They will be transported back to the ground and utilized for industry and our life. Astro biology invites us to the absolute question of where life comes from and what we are. Especially D and P types asteroids will provide essential keys to them.

It is very much straight forward direction that humans extend their activity to the outer solar system. In view of past space exploration, ballistic flights dominated and no amendment of the flight paths was assumed except very limited use of gravity assists. However, as the Hayabusa flight demonstrated, the trajectories are now released from the yoke of the gravity field, and non Keplerian flights will be commonly adopted. Most of the previous flights driving ion engines and electric propulsion systems utilize solar power instead of nuclear energy. Long term prospect concludes the humans shall use nuclear energy from reactors, as the solar cells become inefficient in outer solar system beyond Jupiter. This is not avoidable, even though it is controversial on the ground. However, those reactors weigh extraordinary heavy with respect to specific mass of the spaceships. And still a lot of technical issues remain not completely solved. For the time being, up to the Jupiter's distance including main belt asteroids, solar power needs to be utilized. How large and huge solar cells are deployed is a key technical problem. But, it is the common subject to the pure photon propulsion, passive solar sails. This implies the solution is found for solar sails. Contemporary thin film solar cells can be carried on the solar sails membrane. And heavy duty electric propulsion means will be driven in a distance from the Sun.

As this simplified discussion indicates, the next generation space exploration and
utilization should rely on the solar sailing technology, and it is requisite for expanding humans activities in all the solar system around. The presentation will glimpse about how humans will operate space technology assets including thin film solar cells and electric propulsion, etc. in future. The scenarios will refer to the Deep Space Port constructed at Sun-Earth Lagrangian points L1 or L2. Unfortunately, space business tends to be conservative and makes the activities avoid challenges. The purpose of this presentation aims at inspiring younger generation to look at the targets in near future.