Solar sail is not a new idea, in fact Johannes Kepler, the astronomer, in the 16th century observed the comet tails blow away from the sun and he suggested that vessels might likewise navigate through space using appropriate fashionable sails.

**How it works**
Sunlight is made of photons. Photons when hit surface it transfers a force, called momentum to the object. In a reflective object the momentum or pressure is doubled.

**Made of**
Because the sunlight exerts a very weak pressure, the material used to build a solar sail spacecraft must be very light and strong. The material used in the LightSail 1 from The Planetary Society is called Mylar, an aluminize kind of plastic about \( \frac{1}{4} \) the thickness of a trash bag. Also the acceleration of the spacecraft is proportional of the height of the spacecraft plus the sail versus the size of the sail. For example: 5 kg of spacecraft + sail versus 32 m\(^2\) of size of sail and because of that the spacecraft is very small, 3 cubes of 10cm\(^3\) each.

**Constant acceleration**
The sunlight is constant so the acceleration in the solar sail also is constant, which means a solar sail spacecraft may start with an acceleration of 0.06m/s/s and then in 100 days it can be at 14,000km/h and in 3 years 240,000km/h (with this velocity we can reach Pluto in less than 5 years, for example the Pioneer 10 probe launch in 1972 took 11 years to reach Pluto).

**How far we can go**
The great advantage of solar sail is that it doesn’t need fuel. It is perfect for a return trip. The velocity also depends on time exposed to sunlight. However beyond the orbit of Jupiter the energy from the sunlight is too weak to keep accelerating. To overcome this problem highly focused beams of lasers can be directed at the sails to boost them into interstellar trajectories.

**Purpose**
Solar sail can be used to boost or decrease orbits of spacecraft. It can literally stop in space, by having the right angle of sunlight hitting the sail versus the gravity of the object. And by hold a spacecraft in position it can allow monitoring of solar storms, for example or it can become a stable observation of the Earth.
But from my point of view the great achievement that solar sail can make is the possibility of manufacturing in the space, maybe using material from asteroids or planets.
The relevance of solar sail with our subject for me is a way of travelling in the space using a non fuel spacecraft.

**Bibliography**