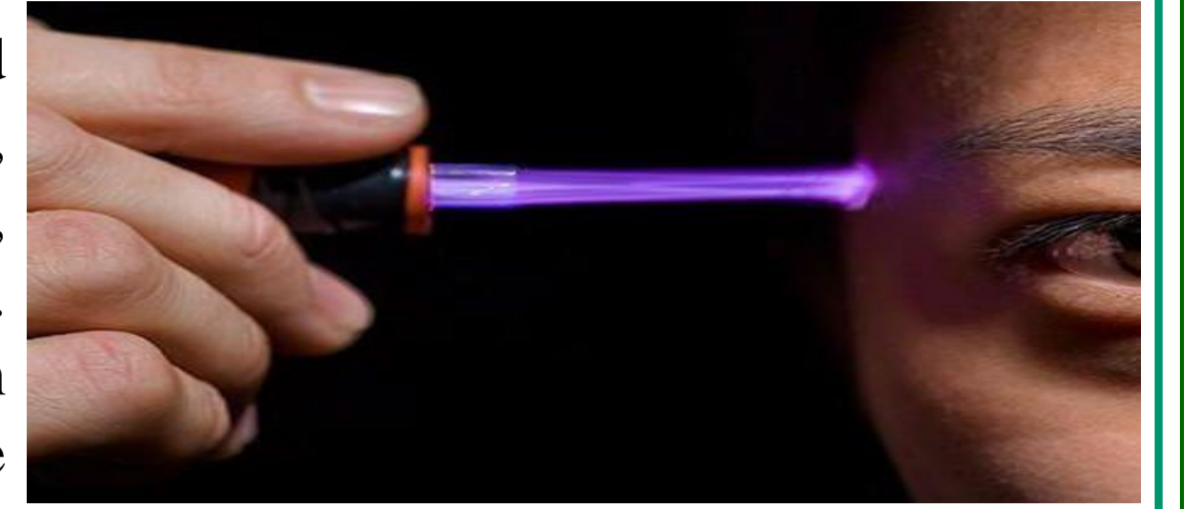


Plasma chemistry for chemical transformations, macromolecular depositions and surface modification of materials like polymers, nanostructures like nanoparticles, nonpatterns, nano topographies, nanocomposites for advanced material properties etc. and the potential capacities of these techniques in extending material properties beyond the hitherto known levels of knowledge and so in the applications are bringing revolutionary benefits to society and in the quality of life. These are apart from the heavy industrial applications of plasma science and technology already in use in diverse fields. Also to be mentioned is the promising hope of controlled nuclear fusion as the source of almost inexhaustible much needed energy to make everything possible.

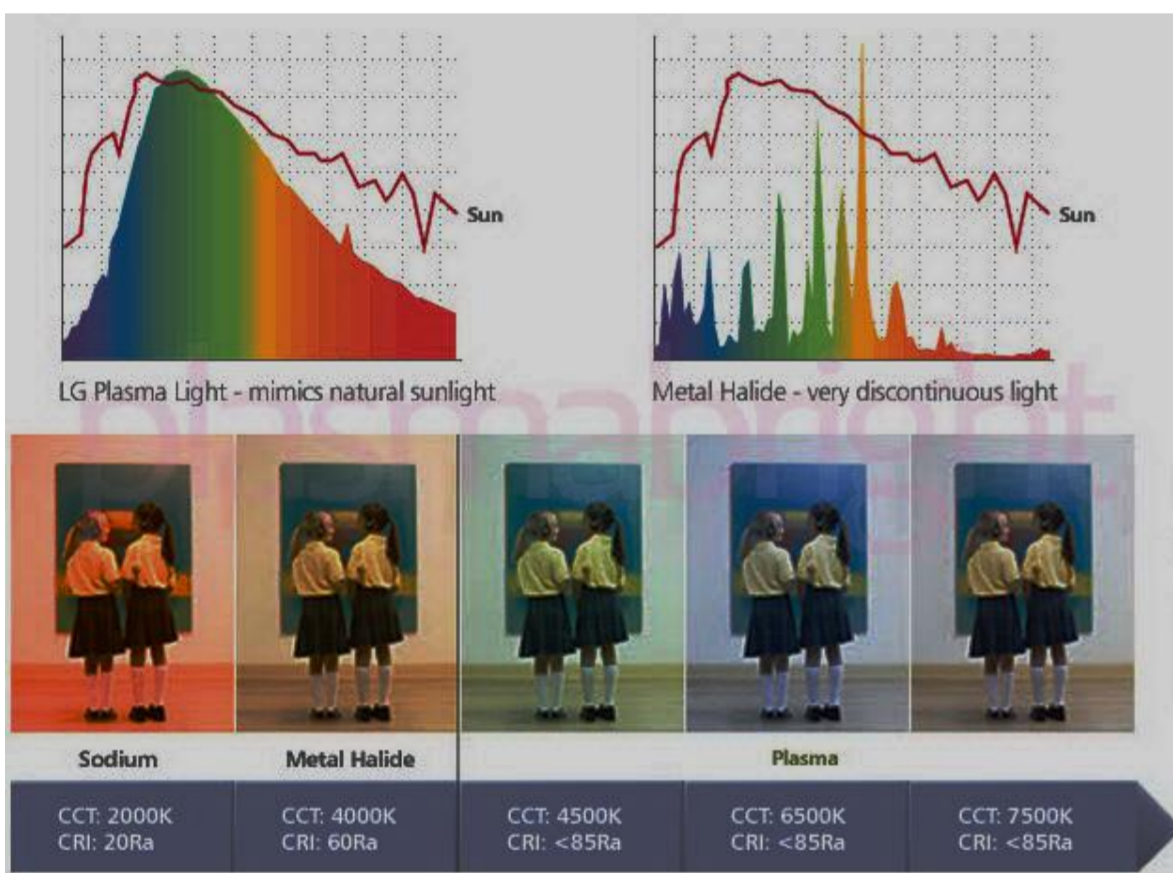
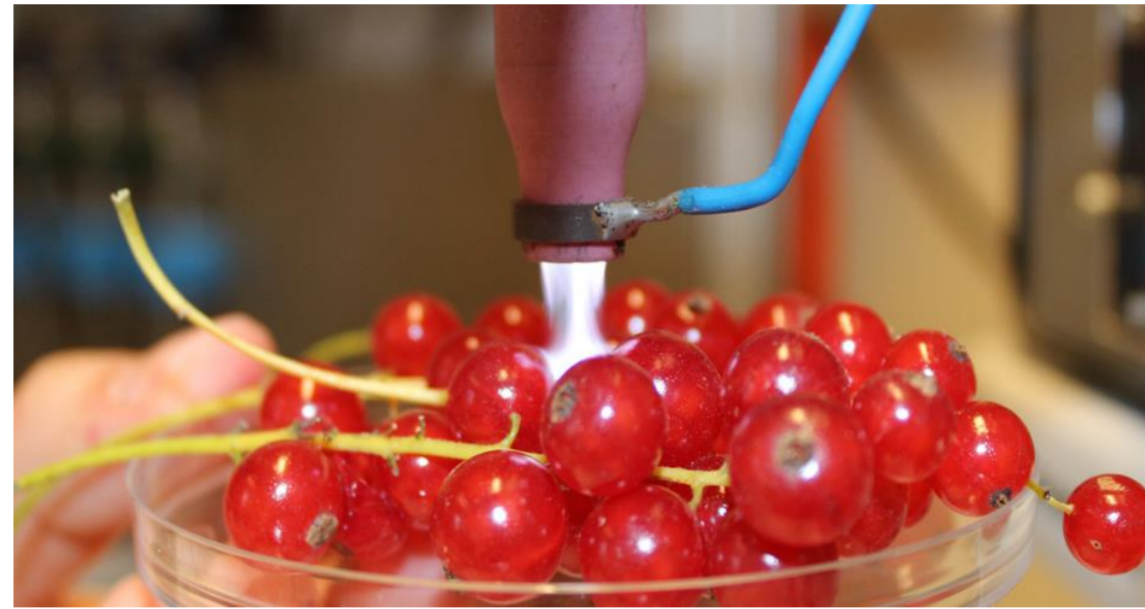


Hydroxyapatite (HA-calcium phosphate ceramic) **Plasma Coating** enables accelerated growth and reconstruction of the bone tissue on **metallic body implant surfaces**. This bio-active material integrates (osteo integration) itself onto the bone structures without being broken or getting dissolved. HA coatings has pores which enhances the growth of bone tissue and gives good mechanical stability. Plasma enabled Titanium coat is used for when extra high strength bond is required. Combination plasma coating of Ti and Ha gives the advantage of the roughness of the Ti and the bio-activity of the HA.

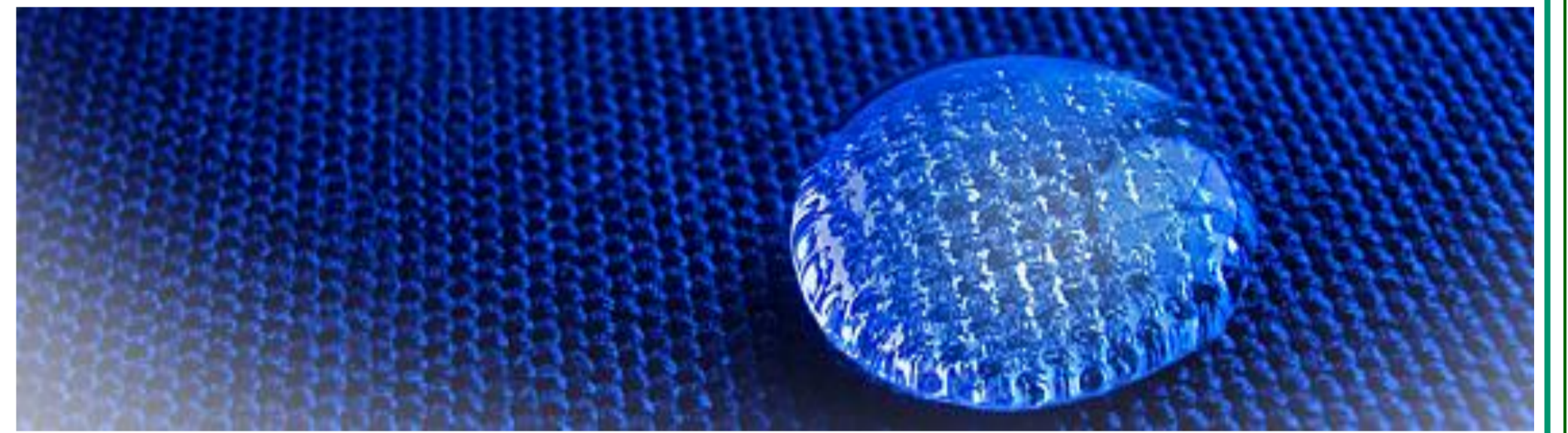
Plasma Assisted Food Processing can be used to decontaminate raw foods like nuts, meat, poultry, fish, dried milk, herbs and spices, processing equipment and packaging materials. These dry and rapid advanced pasteurization methods with no toxic residuals and adverse effects consume less energy and can stop biofilm formation.



Plasma Medicine: many therapeutic applications of plasma have been verified and in use. It works as antiseptic in living cells without affecting surrounding tissues while stimulating tissue regeneration. Dermatology, dentistry and wound healing are possibilities. In **electrosurgery** the **argon plasma coagulation (APC)** is used to cut, stop bleeding and also in the selective destruction of tissues.

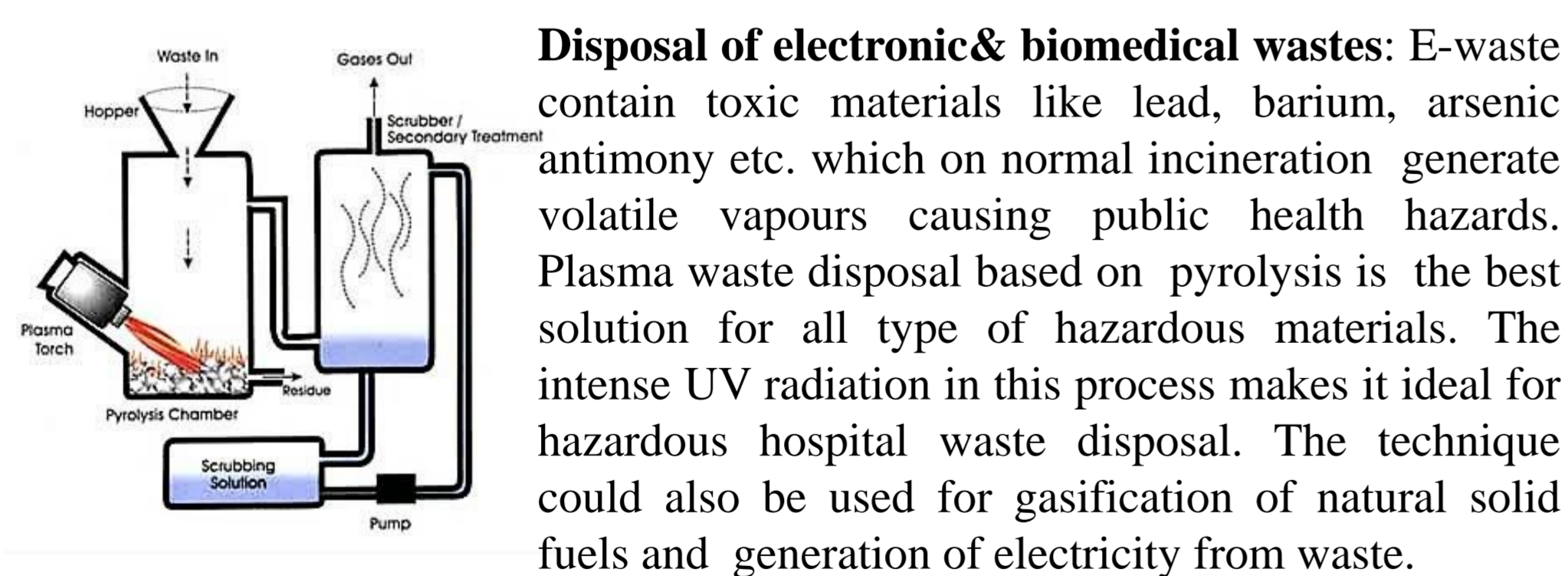
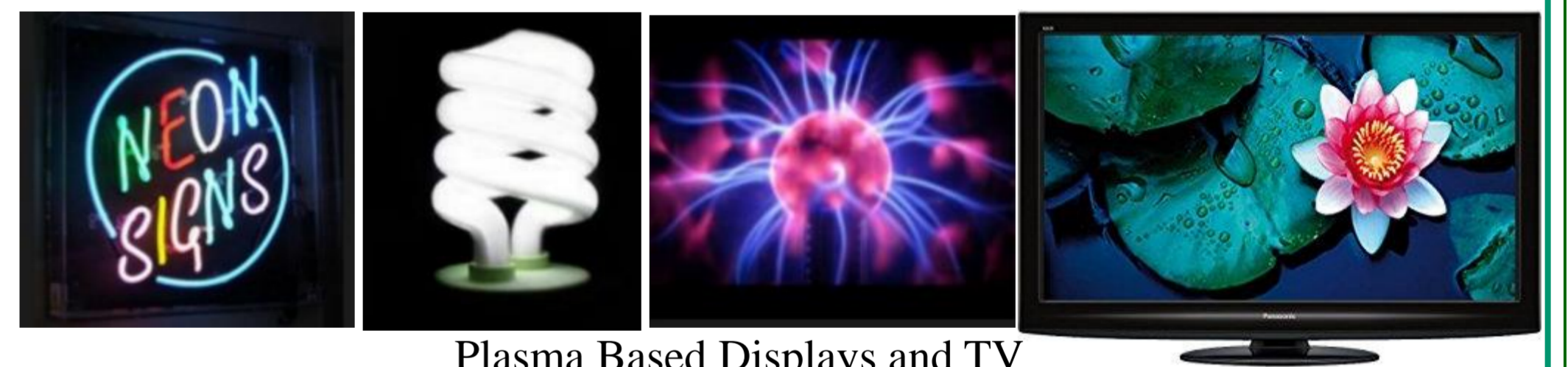


Plasma light Systems are going to be the next generation revolutionary light systems characterised by highest luminescence per minimum power consumption, most efficient, eco-friendly, long life and truly flicker free. The **closest manmade light source** that equal sunlight in terms full wavelength spectrum which enables human eyes to see things in natural hues and colours.



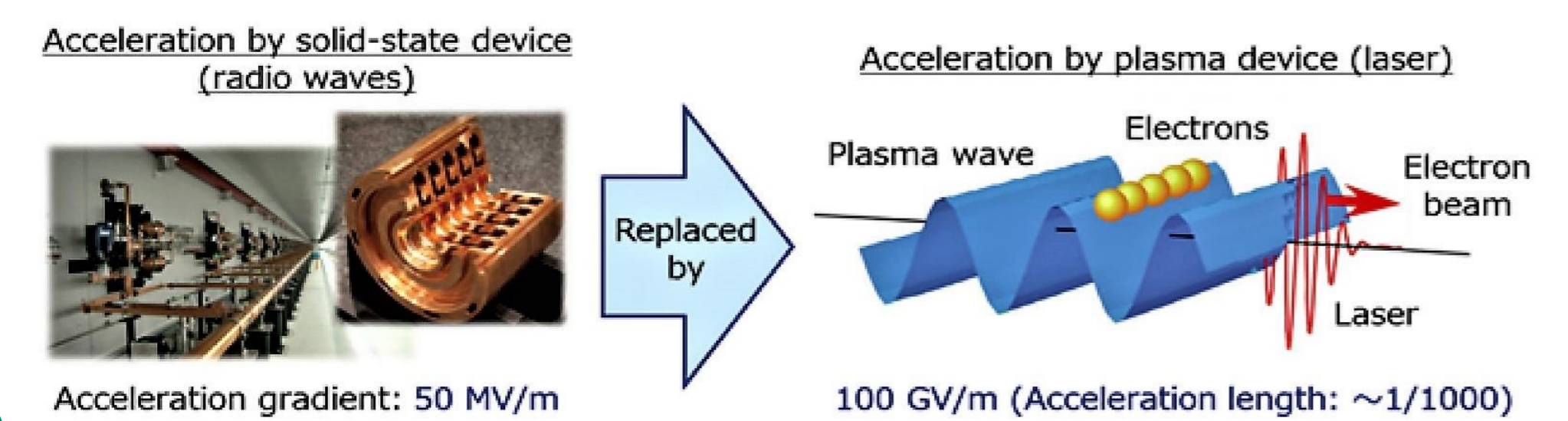
Desired functionalization of textiles where fabric could be given self-cleaning finishes, bioactive surfaces and flame retardant properties etc. Plasma treatment improves wettability of fibres and yarns allowing fast and durable bonding with dyes. Surfaces could be converted to hydrophobic and dirt-repellent. Less expensive compared to traditional methods. Institute of Plasma Research (IPR) has demonstrated a cutting edge technology make it possible to spin 100 per cent Angora yarn which was other wise very difficult and wasteful of the highly valued fibre.

Environmental Control is a vast area of plasma applications. Most prominent among this could be **treatment and purification of water** in a very efficient, cost effective, clean and energy-efficient way. **Waste water treatment, desalination** are also very important application for societal well-being.



Plasma Based Particle accelerator technology makes it possible for table top size extremely high energies accelerators with energy levels which the present RF cavity based gigantic machines have limitation to reach. This possibility has very high potential in scientific research and many other applications in medicine, defence etc..

Aerospace structures and Space voyages: Composites toughened with Plasma have shown to possess vast improvement in physical qualities which would guide the manufacturing of next generation aerospace crafts. **Plasma polymerisation** has the biggest advantage that it could be directly attached to a desired surfaces while the chains are still growing. **Plasma propulsion engines** offer wide advantages over conventional system making them better suited for long-distance interplanetary space travel missions.



Controlled Nuclear Fusion: An inexhaustible source of abundant and clean energy. Availability of abundant energy is the most important criteria for human well being. Fuel to energy ratio in fusion is tremendously high: 2.5 pounds of deuterium and tritium is equivalent to 9000 tonnes of coal in generating 1000 MW of power and emits just 2 kg of harmless helium gas compared to 30000 tonnes of CO₂. Fusion Fuels are available for thousands of years to meet the ever expanding need for enormous amount of energy.

To meet the energy needs of a city of 1 million people one would need:

Either

- 250,000 tonnes of oil
- Or
- 400,000 tonnes of coal
- Or
- 60 kg of fusion fuel