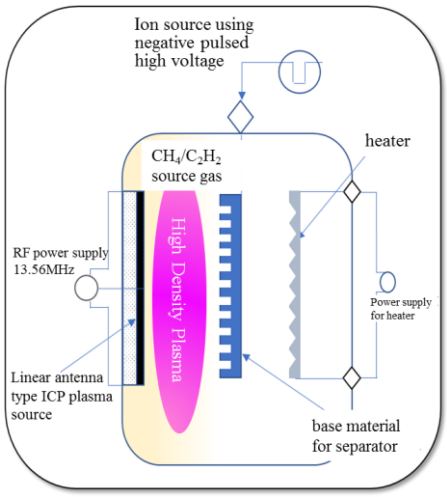
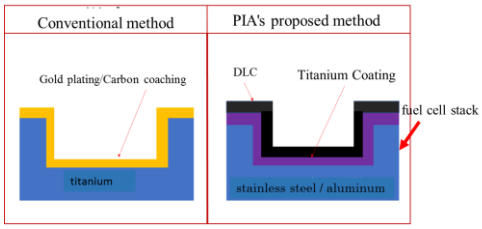
Development of an Innovative DLC Deposition System to Reduce the Cost of Metal Separators for Fuel Cells

Our core technology is a surface modification technology that combines ion implantation and plasma film deposition technology by using an ICP plasma source developed by our original development, and this is truly a new technology that improves the functionality of material surfaces by adding new property on the material surface. In particular, our company is able to synthesize special DLC thin films - intelligent DLC thin films - with various performances and features, and we are expanding our business into various application fields. For example, our DLC thin films can be added on the materials surface of various functions that are the mechanical properties such as sliding properties and wear resistance, the physical and chemical properties of gas barrier properties and corrosion resistance, and the electrical properties of insulation and conductivity. In addition, due to the effect of the ICP plasma source that a high-density plasma can be generated, the DLC films can be performed at a lower temperature than that of other film forming methods. So, it is an innovative technology for the surface modification that can be applied not only to metals but also to non-ferrous metals with low heat resistance, as well as rubber and resin surface treatments.



Principles of the PIAD Method

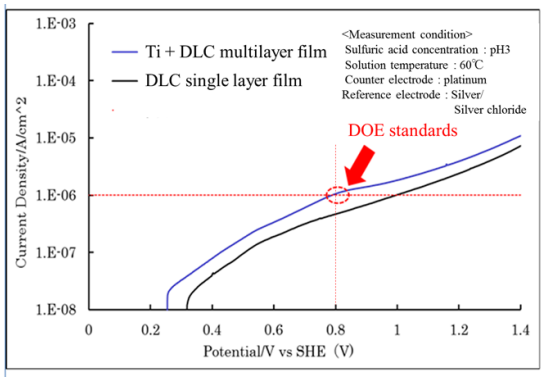


separators Surface Modification

Currently, with the support of New Energy and Industrial Technology Development Organization, our company is developing surface treatment technology for metal separators used in fuel cells, which are expected to provide new energy for a decarbonized society. At the same time, the development of a large-capacity plasma ICP source that can support future mass production is also on going with support from national R&D organization. The developing of a production technology is now carried out that DLC thin films can be performed at high speed on stainless steel separators and aluminum separators by using of the In-Line film coating equipment with this ICP plasma source, which will greatly contribute to cost reduction. In particular, aluminum separators are very beneficial due to their low cost and weight reduction.

high-speed continuous film deposition system

Already the developing of metal separators using stainless steel and aluminum as the base materials has been started, coated with a DLC thin film that has both conductivity and corrosion resistance properties. These evaluation results largely exceed the standard values of US DOE (i.e., United States Department of Energy), and also sufficient performance has been indicated in long-term power generation tests.



Separator Performance