Nano4Energy’s devotion to development of plasma technology has led to significant improvements of coating properties as well as productivity in every day manufacturing. Due to the development of power supplies we have the possibility to tailor the whole process to optimize every parameter. The knowledge has been implemented in several industrial systems that are in the market today.

**HiPIMS HiPlus technology & DLC on glass and plastics**

The HiPIMS HiPlus function is a great example that have led to improvements in both properties and deposition rates; boosting the HiPIMS technology in industrial applications. Exceptional adhesion and smoothness with deposition at low temperature on both conducting and insulating substrates.

The results have been proven successful on both mobile screens, polycarbonate solar roofs and high volume roll-to-roll plastics. The DLC have shown higher density, higher hardness and increased durability as well as increased production speed.

**Oscillating sand abrasion test ASTM F735**

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<tr>
<th>5 min, 750 cycles</th>
<th>HIPIMS DLC coated glass</th>
<th>Uncoated glass</th>
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**State of the art DLC recipes implemented in commercially available industrial coating systems**

We work closely with our customers in order to implement the latest technology of thin film coatings to every day production. Nano4Energy have implemented several of the DLC recipes in a high quality purpose designed manufacturing tool, manufactured by PVT, the xPro4C, ready for automatic high volume production.
By depositing DLC coatings by using HiPIMS with the HiPlus technology it is possible to enhance the ionization of both the sputtered carbon and argon species. The ion bombardment induced by the positive pulses results in higher compressive residual stresses and densification of deposited DLC coatings as well as a higher sp3 ratio improving the mechanical properties of the DLC.

DLCs hardness and elastic modulus are enhanced when higher pulse voltages (> 300 V) are applied. The increased presence of highly energetic C⁺ ions is fundamental for the improvement of mechanical properties of the DLCs, which are denser and present a more ordered structure. The application of positive pulses is not only limited to carbon plasmas but can also offer great benefits for optimizing other coatings systems like hard carbides and nitrides.