

Renewable energies: innovative materials for a market with a promising future

In response to a growing demand for energy and a need to preserve the environment, the Arkema group is innovating to speed up the development of renewable energies. It provides new materials which improve the performance of solar panels and lithium-ion batteries, thereby strengthening the competitiveness of these business segments.

The global demand for energy should double by 2050. Given the optimized use of fossil fuels and the necessity to reduce greenhouse gas emissions, **resorting to renewable energies** has now become inescapable. The Arkema group has made this issue **one of its major fields of innovation** and is involved in growing new markets, both in terms of energy production and energy storage. At present, **one out of every three solar panels contains a product made by the Group.**

Improving the competitiveness of solar energy

Used in the manufacturing of solar panels, these materials contribute to increasing their **performance**, while also reducing their cost:

- **PVDF Kynar® Film** fluorinated polymers, extruded as ultra-fine and resistant multilayer films, protect the backside of the panels against humidity and solar aging. As a result, the lifetime of panels is extended beyond 20 years



- The Group has developed a grade of **Evatane® EVA** (ethylene vinyl acetate copolymers) which is designed for the encapsulation of crystalline silicon cells, a costly and fragile material. The key advantages presented by this resin are its perfect transparency, the absence of any contact problems when it is applied, no yellowing with time and excellent adherence with glass surfaces. It contributes to the production yield and longevity of the panel
- To improve its EVA offering, the Arkema group developed **Luperox® Solar**, a grade of organic peroxide, which speeds up EVA crosslinking used for the encapsulation of cells, thereby optimizing the production rate of panel

Apolhya® Solar : encapsulating photovoltaic modules

Researchers at the Arkema group recently developed **Apolhya® Solar**, a nanostructured thermoplastic polymer, designed for the encapsulation of new generation **flexible photovoltaic modules, also known as "thin layers"**.

Apolhya® Solar combines thermo-mechanical, adhesive and creep resistance properties with perfect transparency. As no crosslinking is required for the implementation of this product, the production time of the panels is reduced, and end of life recycling is easier.

Maximized storage of lithium-ion batteries

The development of renewable energies, by definition intermittent (wind and solar power), combined with **nomad technologies** (electric vehicles, laptops, mobiles, tablets, etc.) requires **rechargeable batteries** with ever higher levels of performance. To meet this need, the Arkema group makes high molecular weight Kynar® PVDF polymer materials, specifically designed for **lithium-ion battery** components. Used as binders in the manufacturing of their electrodes, they contribute to their **longevity** and improve their performance thanks to a very high level of **electrochemical resistance**.

At present one third of the lithium-ion batteries found inside personal computers and mobile telephones contain Kynar® PVDF.

Kynar® HSV 900 and Kynar® ADX: driving "greener" and longer

Kynar® HSV 900 and Kynar® ADX are high molecular weight polyvinylidene fluorides (PVDF), specifically designed for batteries in **hybrid and electric vehicles**. At present they are the only binders that meet the specifications of **electrodes** for this type of very high energy density **batteries**, i.e. which are able to store a high amount of energy in a limited volume.



Product features of PVDF Kynar®