ENVIRONMENTAL RISKS ASSOCIATED WITH PV PANELCOMPONENTS

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Solar energy is gaining popularity worldwide as it provides an environmentally safe way to generate electricity. However, the components of solar panels also carry environmental risks that can be hazardous to the environment.

A solar panel consists of several components, including glass, an aluminum frame, an EVA sheet, a solar cell, connecting ribbons, a back sheet, and a junction box.

EVA is commonly used as an encapsulant material to protect and seal photovoltaic cells in solar panels. Its excellent transparency, flexibility, and durability make it a popular choice in the solar industry. However, like any material, EVA has the potential to pose environmental risks during solar panel recycling. One of the main concerns is the release of acetic acid, a byproduct of EVA decomposition, into the environment. Acetic acid is a corrosive liquid that can cause burns and respiratory problems in humans. If acetic acid is released into the environment during the recycling of solar panels, it can pose a risk to nearby plants and animals.

Another concern is the leaching of other chemicals from the EVA sheet into the soil and water. EVA contains various additives, such as plasticizers, stabilizers, and pigments, that can leach into the environment during the recycling process. These chemicals can be harmful to soil microorganisms, aquatic life, and human health if they enter the food chain.

Connecting ribbons and junction box may contain fluoropolymers, which can also pose a hazard to the environment if they are not disposed of properly. Fluoropolymers are known for their durability and resistance to degradation, which can result in their accumulation in the environment over time. This persistence can have long-term ecological consequences and impact wildlife populations and habitats, as fluoropolymers can accumulate in soil, water bodies, and ecosystems.

Some fluoropolymers, including certain degradation products, may contain toxic substances that can be harmful to the environment and living organisms. For instance, perfluorinated compounds (PFCs), which fall under the category of fluoropolymers, have been found to be toxic to aquatic organisms, as well as persistent and bioaccumulative. PFCs can also be transported over long distances in the environment, leading to contamination of even remote areas. Furthermore, the potential for biomagnification of fluoropolymers in the food chain can pose risks to higher trophic level organisms, including humans, as the concentration of these compounds increases as they move up the food chain.

References:

1. Huang, Y., Xu, Z., & Wang, Z. Environmental impact of solar panel recycling: A systematic review. Renewable and Sustainable Energy Reviews. 2019.#109, 288-299.