RISK OF RELEASE AND EXPOSURE OF SILVER FROM NANOWIRE TRANSPARENT CONDUCTIVE FILMS: AN ELECTROCHEMICAL METHOD FOR A QUICK AND SIMPLE DIAGNOSTIC

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Silver nanowire transparent conductive films (AgNW TCFs) are advanced nanomaterials designed to be applied in a wide range of technologies from electronics, optoelectronics to heatable films and biomedical devices. Although TCFs are commonly protected by a coating material before incorporation into a device, there is a risk for release of dissolved or nanoparticulate compounds either during use or after diposal at end-of-life, because of some degree of permeability of the protective material either at molecular level or because of mechanical or chemical degradation. Since ionic and nanoparticulate Ag represents a toxicological risk for the biosphere, there is a need for quantifying the potential Ag release from these product components.

In this work, we developed an accelerated test to assess the risk of silver release from silver nanowire transparent conductive films (AgNW TCFs) and its transfer to users and the environment. An indicator parameter is used to quantify the material corrodibility. The test is established quickly, 20 minutes are sufficient for a diagnostic result.

Our work responds to a need to develop control methods for nanomaterials to monitor metal release and potential exposure. In our approach, very low electric power and no harmful reagents are used, in line with green technology precepts.