



<p>H2020 – NMP PILOT 02</p> <p>Integration of novel nano materials into existing production lines</p>	
<p>Title: Processing and control of novel nanomaterials in packaging, automotive and solar panel processing lines</p> <p>Acronym: OptiNanoPro</p> <p>Grant Agreement No: 686116</p> <div style="text-align: center;">  </div>	
Deliverable 1.1	Report on the state-of-the-art review
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Publishable Executive Summary

This deliverable, *D1.1 Report on the state-of-the art review*, is part of the work carried out in WP1, *Industry specifications*, of the EU- funded NMP Pilot project OptiNanoPro, *Processing and control of novel nanomaterials in packaging, automotive and solar panel processing lines*. The task 1.1's main objective is to perform an updated review of the technical state of the art dealing with the target nano-enabled products and processes. As such, a revision of the literature, patents and possible competitive commercial technologies was carried out by all partners (individual contributor(s) specified in the end of the title of each section) to ensure that all relevant research in the area was identified and that any development since proposal preparation stage was picked up. This deliverable will be used as a basis of 2 review papers respectively on the suitable nanocomposites for selected applications and on the process monitoring systems:

- Review on the processing and properties of polymer nanocomposites and nanocoatings and their applications in the packaging, automotive and solar energy fields
- Recent prospects in the in-process monitoring of nanocomposites and nanocoatings by optical technologies

For the last decades, nanocomposites materials have been widely studied in the scientific literature as they provide substantial properties enhancements even at low nanoparticles content. Their performance depends on number of parameters but the nanoparticles dispersion state remains the key challenge in order to obtain the full nanocomposites' potential in terms of e.g. flame retardance, mechanical, barrier and thermal properties, etc. that would allow extending their use in the industry. While the amount of existing research and indeed review papers regarding the formulation of nanocomposites is already significant, after listing the most common applications, this review more in-depth focuses on the properties and materials of relevance in three target sectors: packaging, solar energy and automotive.

In terms of advances in the processing of nanocomposites, this review discusses various enhancements technologies such as the use of ultrasounds for in-process nanoparticles dispersion. In the case of nanocoatings, it describes the different conventionally used processes as well as nanoparticles deposition by electrospray. Existing and promising control systems for nanocomposites and nanocoatings production are also given a particular attention. All in all, this review gives the basics both in terms of composition and of processing aspects to reach optimal properties for using nanocomposites in the selected applications. As an outlook, up-to-date nanosafety issues are discussed. Most parts of this review will become available in scientific journal(s) in the near future and therefore be public as opposed to the core of this document which will not be released until the review papers are approved to avoid issues of lost novelty on the original text to be published.