

# **Final Report**

**Project acronym: *ISIBHY***

**Project number: *5127***

**M-ERA.NET Call 2017**

**Period covered: 31/01/2019 to 31/05/2022**

Coordinator:

Dr. Jeremy DiTomaso | [jeremy.ditomaso@rescoll.fr](mailto:jeremy.ditomaso@rescoll.fr) | RESCOLL | France

## 2. Publishable project summary

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Hydrogen as an energy carrier appears as one of the solutions that can respond to the lack of fossil resources and to face the problems of global warming by the reduction of CO<sub>2</sub> emissions. In this context, hydrogen storage plays a crucial role. Today these structures are validated from the point of view of their use in the civil society, but huge limitations in their performances and full exploitation are related to the detachment of the liner with the composite (liner-composite debonding). The chance for improvement lies in the ability to enhance the strength of the bonded interface between the composite and the liner material. This last point constitutes the scientific and technical objective of this project. Research and development program to be set up will consist in developing a glue formulation, which will be more resistant to explosive decompression as well as to the composite-liner tearing. More precisely, the project have combined some work on the chemical formulation of adhesive and specific tests for the characterization of its thermomechanical behavior.

New formulations have been generated with different morphological specificities. Samples of stacked PA liner-composite materials - similar to those used in the wound tanks (TRL 4 and 5) – were manufactured. These stacks were used to evaluate the strength of the assembly to explosive decompression and peeling. A special procedure was experimented to couple a peeling test and simultaneous explosive decompression (TRL 5). Another output is the definition of recommendations and a protocol (normative context TRL 5) which allows qualifying future assemblies' liner composite.

- The surface treatment of the substrates (Polyamide and Epoxy-carbon fiber composite) to improve the wettability and the mechanical performance of the assembly
- The addition of glass beads of different sizes to control the adhesive joint