BIOECOSIM: VALORIZATION OF LIVESTOCK MANURE INTO SOIL IMPROVEMENT PRODUCTS. NH_3 RECOVERY UNIT DESIGN, CONSTRUCTION AND VALIDATION.

I. Montero-Castro[1], J. Arnez-Andrade[1], C.Pérez[1], S.Sanchis[1], M.Boerrigter[1], D. Esperón[2], J. Bilbao[3], S.Laopeamthong[3].

1. LEITAT, Terrassa, Spain.

2. Yflow Nanotechnology Solutions, Malaga, Spain.

3. Fraunhofer IGB, Stuttgart, Germany.

Introduction

BioEcoSIM Objectives:

❖Manure valorization in **biochar**, **mineral fertilizers** (ammonium sulphate, calcium phosphate and struvite) and **energy**.

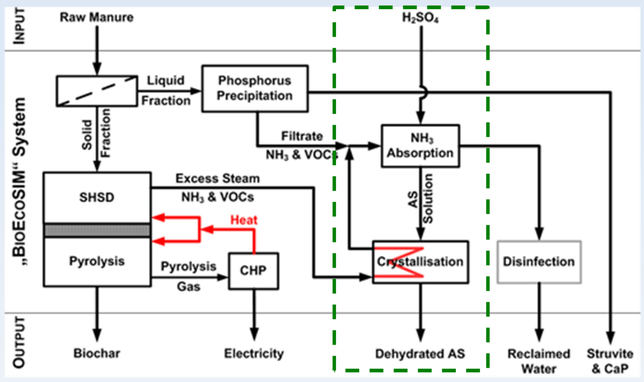
❖**Reduction** of negative impacts derived from **manure accumulation** in livestock intensive productive regions.

❖**Decrease** of ammonia fertilizers obtained through **high energetic-demanding processes** (Haber-Bosch process).

❖**EU dependency minimization of minerals sources** for phosphorous-base fertilizers.

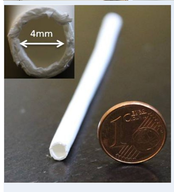
❖**Efficiency** increase for **water consumption rates** for agricultural use.

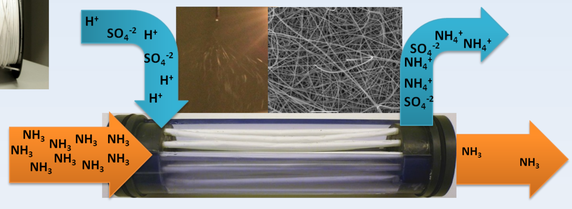
❖ **Economic return for farmers** derived from electricity generation from gas production and fertilizers commercialization.



Materials & Methods

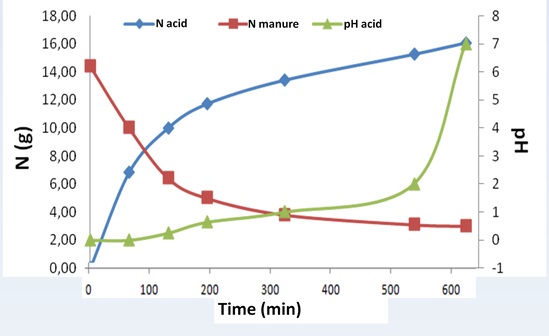
NH_3 recovery unit promotes high efficiency **selective absorption of ammonia** present in the output streams of superheated steam drying and phosphorus precipitation units, enabling the **reaction** with sulfuric **acid to form ammonium sulfate** for later **crystallization**.





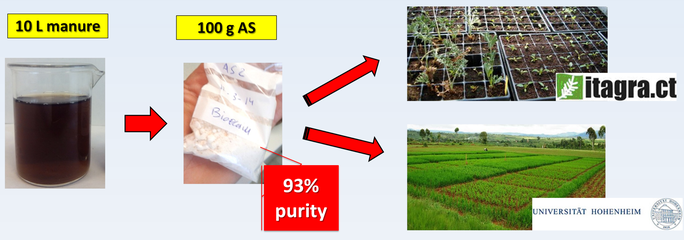
New Poly(vinylidenefluoride-co-hexafluoropropylene) **(PVDF–HFP) membrane** using **electrospinning** technology has been specifically developed

Results



Membrane developed has shown good performance when treating **synthetic input flows**à **87% of NH_3 recovery** was achieved.

AS produced in an integrated lab-scale unit has been evaluated in **greenhouse trials with satisfactory results**.



Concluding Remarks

❖ New designed PVDF-HFP membranes show promising results for accomplishing selective ammonia absorption.

❖ The pilot scale unit has already been optimized and the current validation process has confirmed the outstanding results obtained during lab tests.

❖ Further greenhouse trials are planned with the integrated pilot-scale unit using generated biochar and mineral fertilizers.

❖ Sustainability and business analyses have proved social, environmental and economical viability of BioEcoSIM approach.

Consortium

www.bioecosim.eu

mjorba@leitat.org

"This project has received funding from the European Union's Seventh Programme for research, technological development and demonstration under grant agreement N° 308637. The contents of this material are the sole responsibility of BIOECOSIM Consortium and can in no way be taken to reflect the views of the European Union"