# Valorizing driftwood from waste to an anode in sodium-ion

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**Abstract** Driftwood is transported by rivers and are both of natural and anthropogenic origins. Driftwood plays a role in geomorphology and ecology of the river systems. However, it has a negative impact by increasing destructive power of floods and damaging infrastructure. Collected driftwood can be valorized by hydrothermal carbonization process instead of the often practice of combustion or landfilling.
Objective: The study aims to study the potential of hydrochar produced from different driftwood genera as precursor anode in sodium-ion batteries.
**Keywords:** Driftwood, Hydrochar, Sodium-ion batteries, River management, Génissiat dam

## Methods

- Case study of Génissiat dam:
- Annually an average 1300 tons of driftwood collected from Génissiat dam
- Extracted mechanically for dam safety and stored in a facility near the dam
- Five dominant wood genera; *Alnus*, *Fraxinus*, *Populus*, *Salix* and *Conifer*

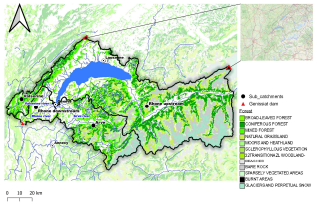

Fig 1: Forest distribution in Génissiat dam catchment

Fig 2: Driftwood at the storage facility of Génissiat dam

- HTC of driftwood to investigate driftwood behaviour at temperature of 200 °C and residence time of 11.5 h
- Physiochemical analysis of raw driftwood and produced hydrochar
- Preliminary testing of produced hydrochar as a precursor anode in sodium-ion batteries

Fig 3: Hydrothermal carbonization 2L reactor

## Results

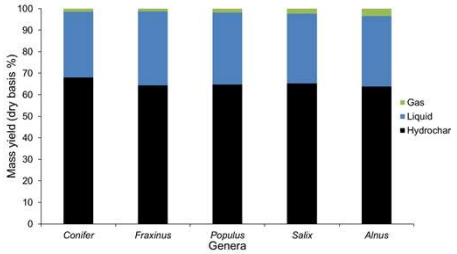


Fig.4: Mass yield of driftwood biomass after HTC

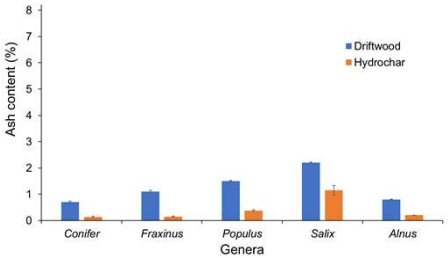


Fig.5: Ash content of driftwood and hydrochar produced after HTC

- The produced hydrochar is richer in carbon (55-57%), and low in ash content which reflects the high potential for anodes application in sodium-ion battery
- Hydrochar derived from different driftwood genera has similar physicochemical properties
- Hydrochar provides a carbon sink that can be used as a high value material

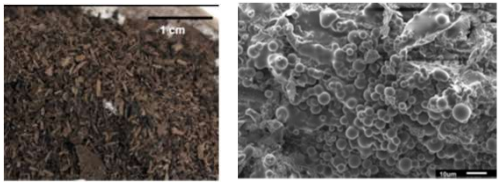

Fig.6: Hydrochar produced from driftwood

- Preliminary testing on hydrochar produced from *Conifer* showed high electrochemical performance with a columbic efficiency of approximately 80%

## Conclusions

- Driftwood collected in rivers for the safety of infrastructures and river dwellers is a neglected river resource that can be utilized
- Hydrothermal carbonisation upgrades the driftwood
- Hydrothermal carbonization is an environmentally friendly process with a low emission of $CO_2$
- Driftwood can be mixed for further processing due to their similar characteristics
- Results on behaviour of hydrochar as an anode in sodium-ion battery show high potential

## Acknowledgement

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