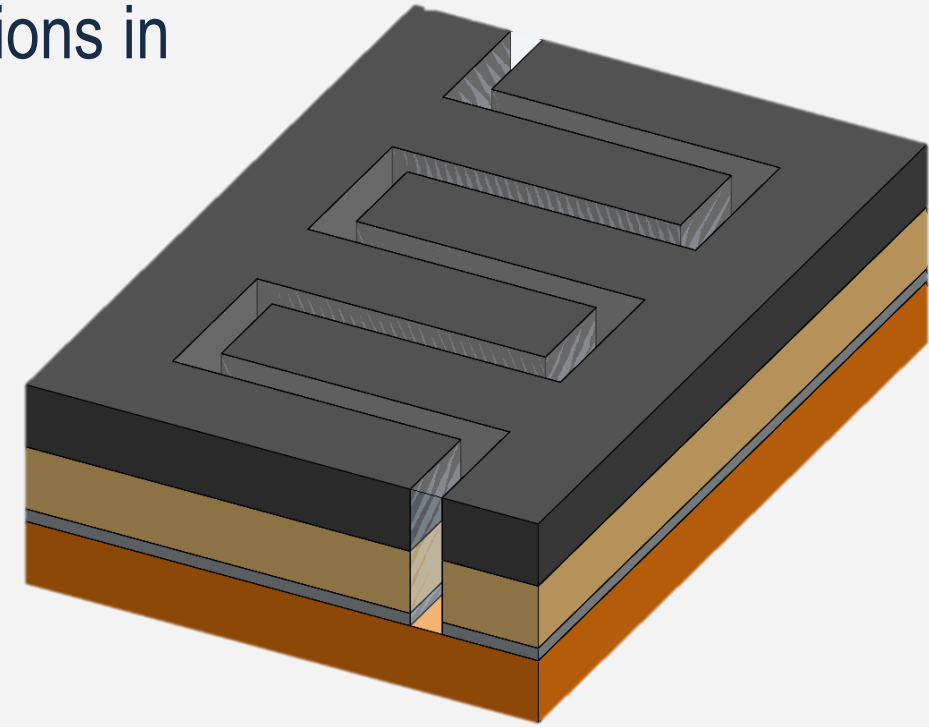
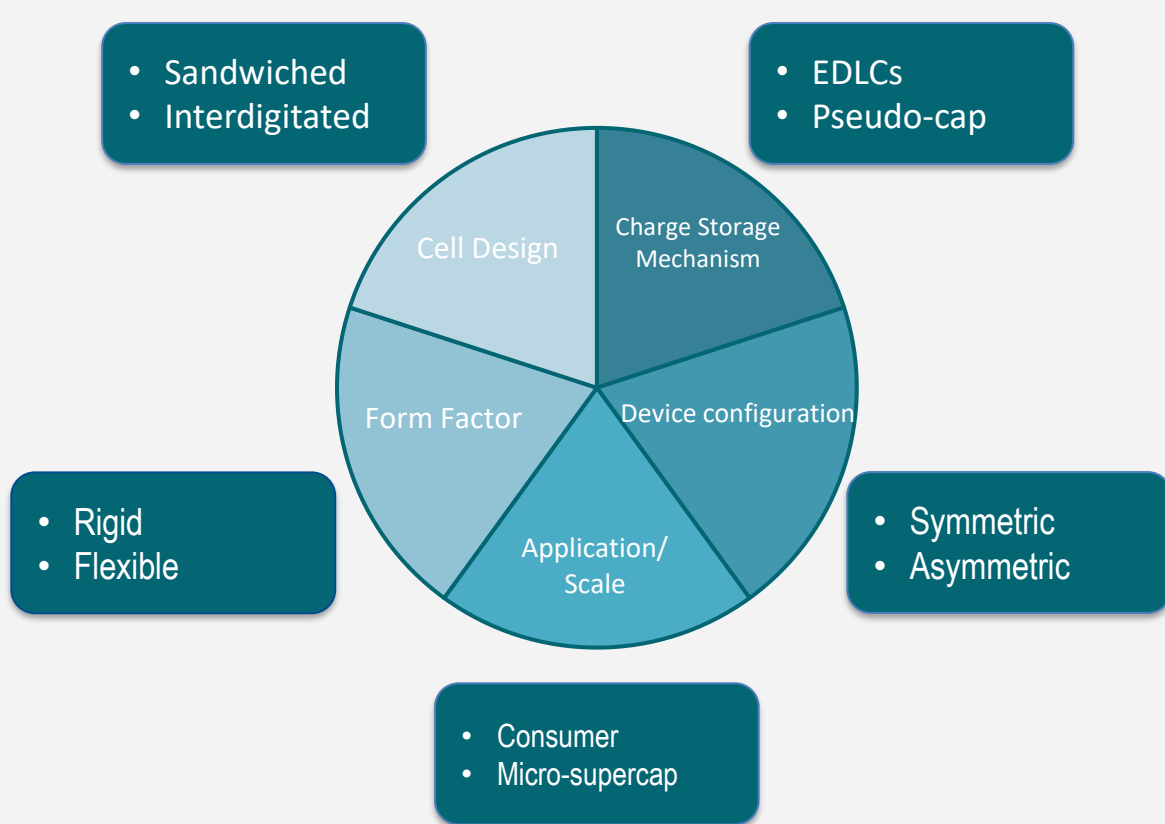


Research context and motivation

In the last years **scaling approach** on supercapacitors led to the definition of **micro-supercapacitors**. The demand of those devices is increasing for many applications in **microelectronics**, such as **Wearable device**, energy storage/recovery and self-powered sensors. Recently, many efforts have been taken to achieve good results in this field in terms of **power** and **energy** densities by using a **sustainable** chain production.

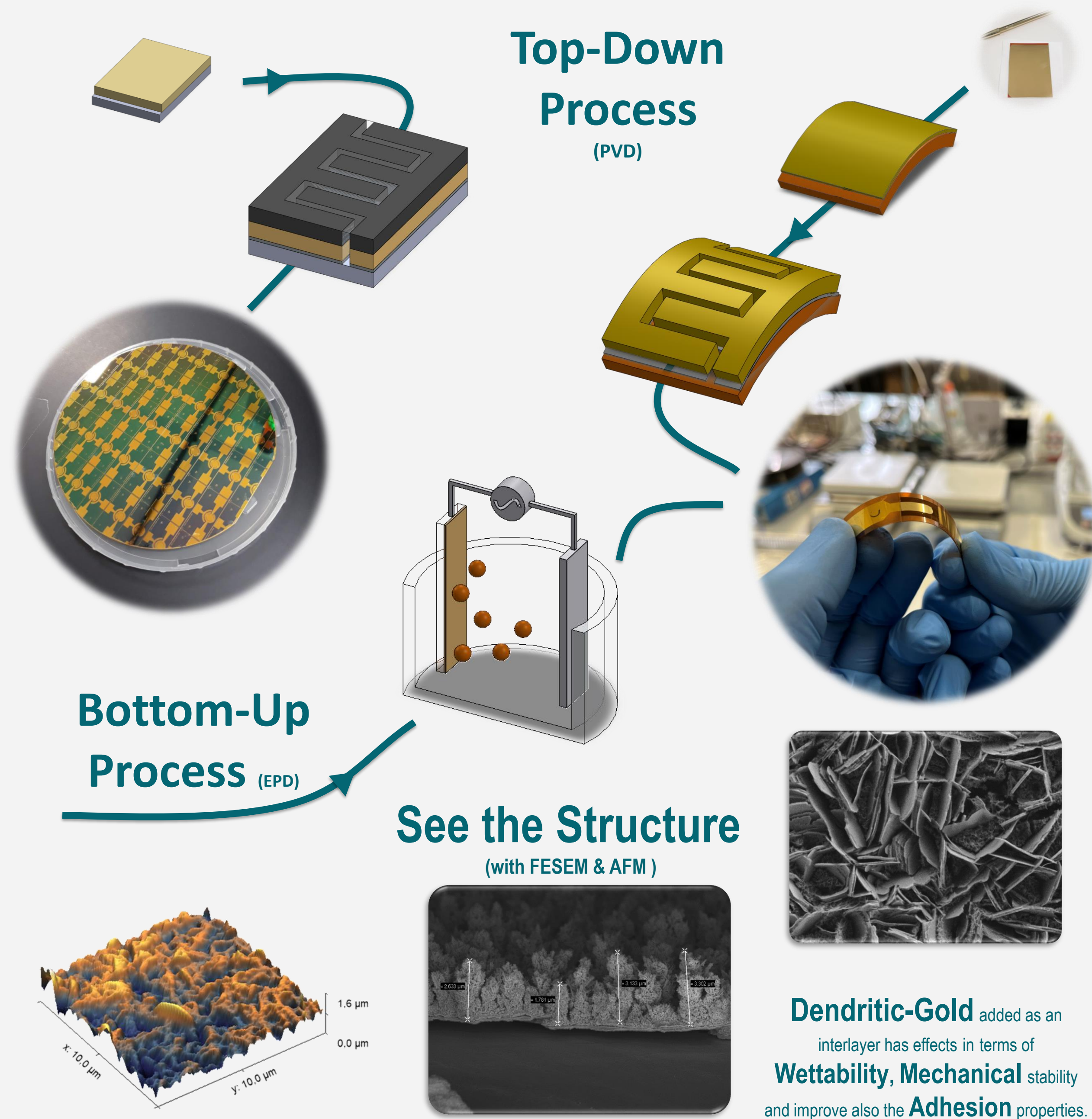


Addressed research questions/problems



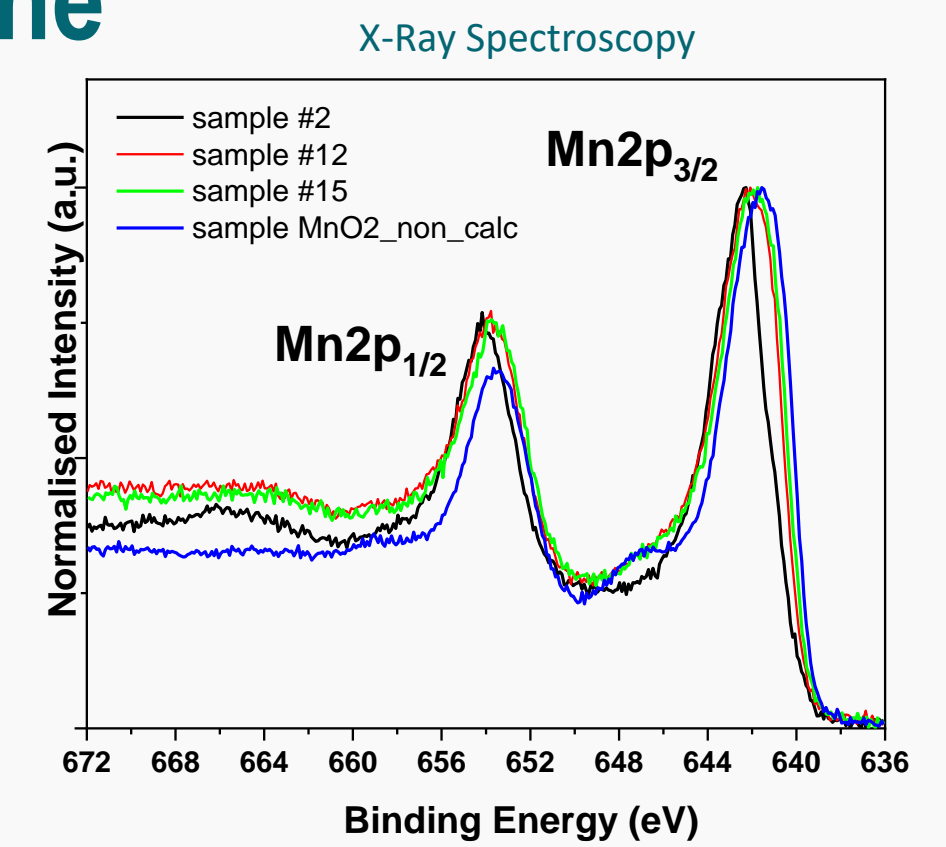
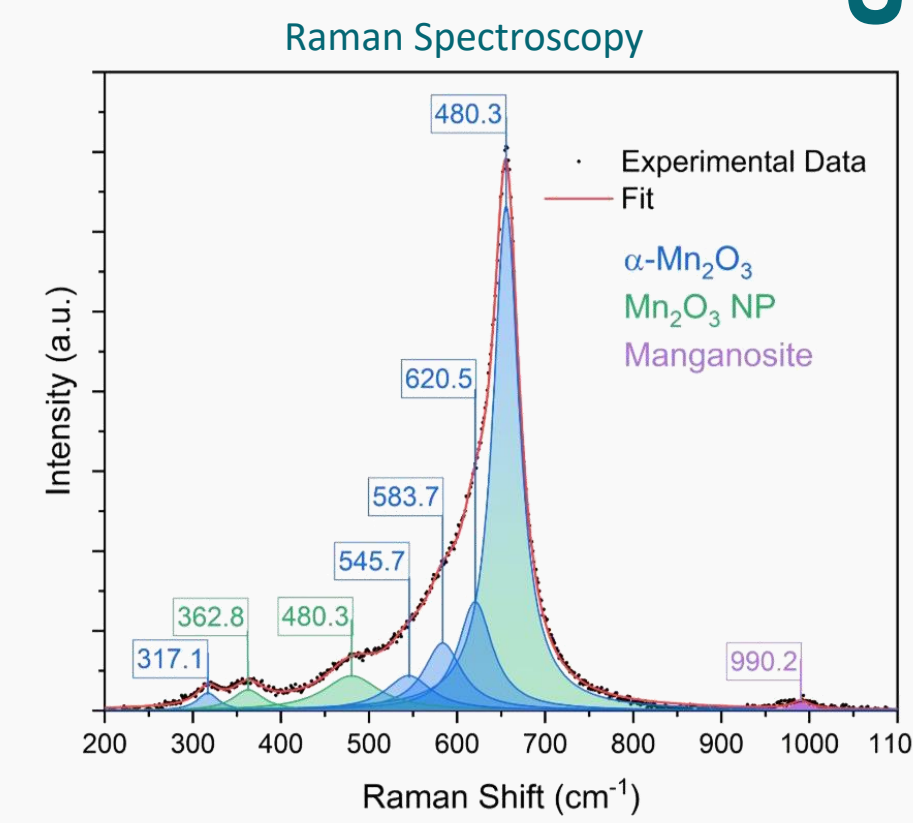
- Water-based electrolytes & "green" binders
- Low impact active materials as **activated carbon** or **metal oxides**.
- Improve the performance by use **Dendritic-Gold**
- Build and test an **asymmetric Device** with large voltage window
- Sealing & Packaging issue

Adopted methodologies

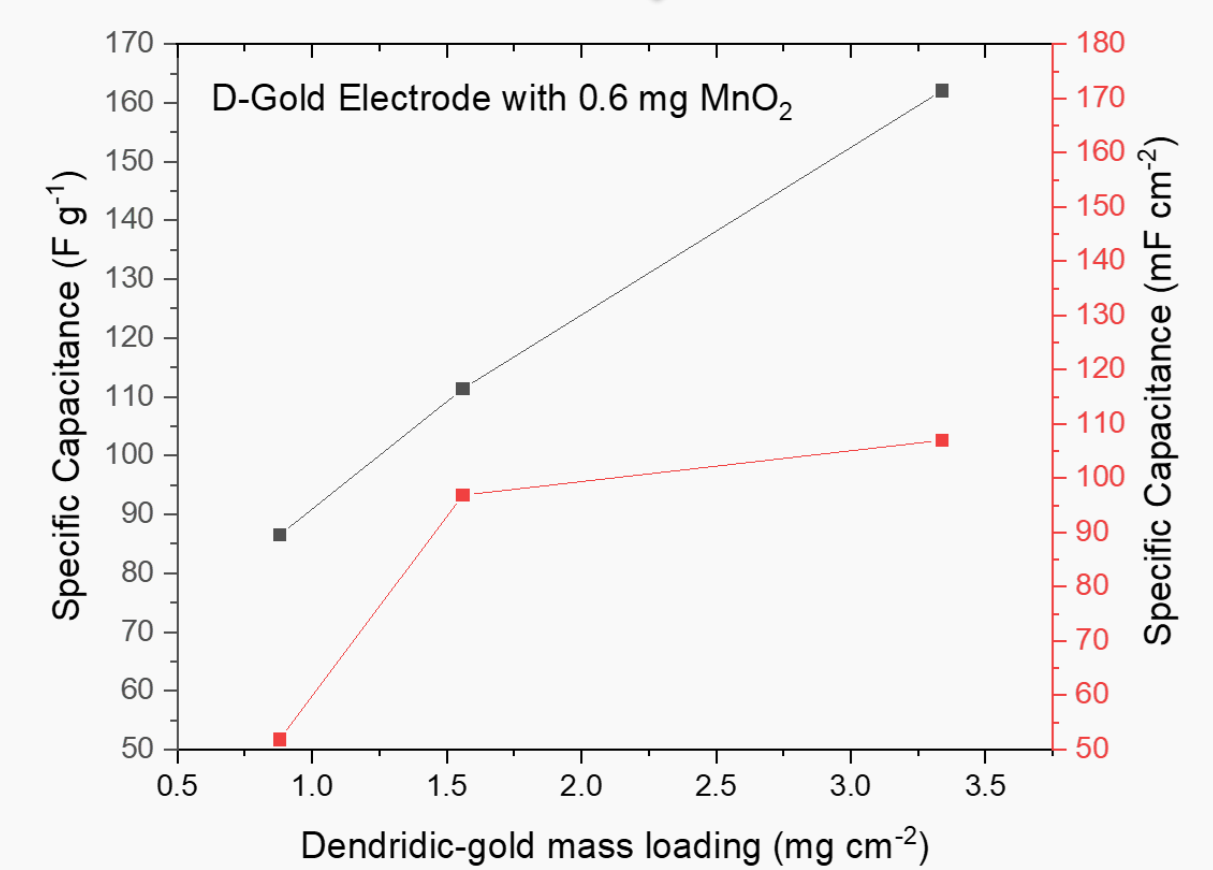
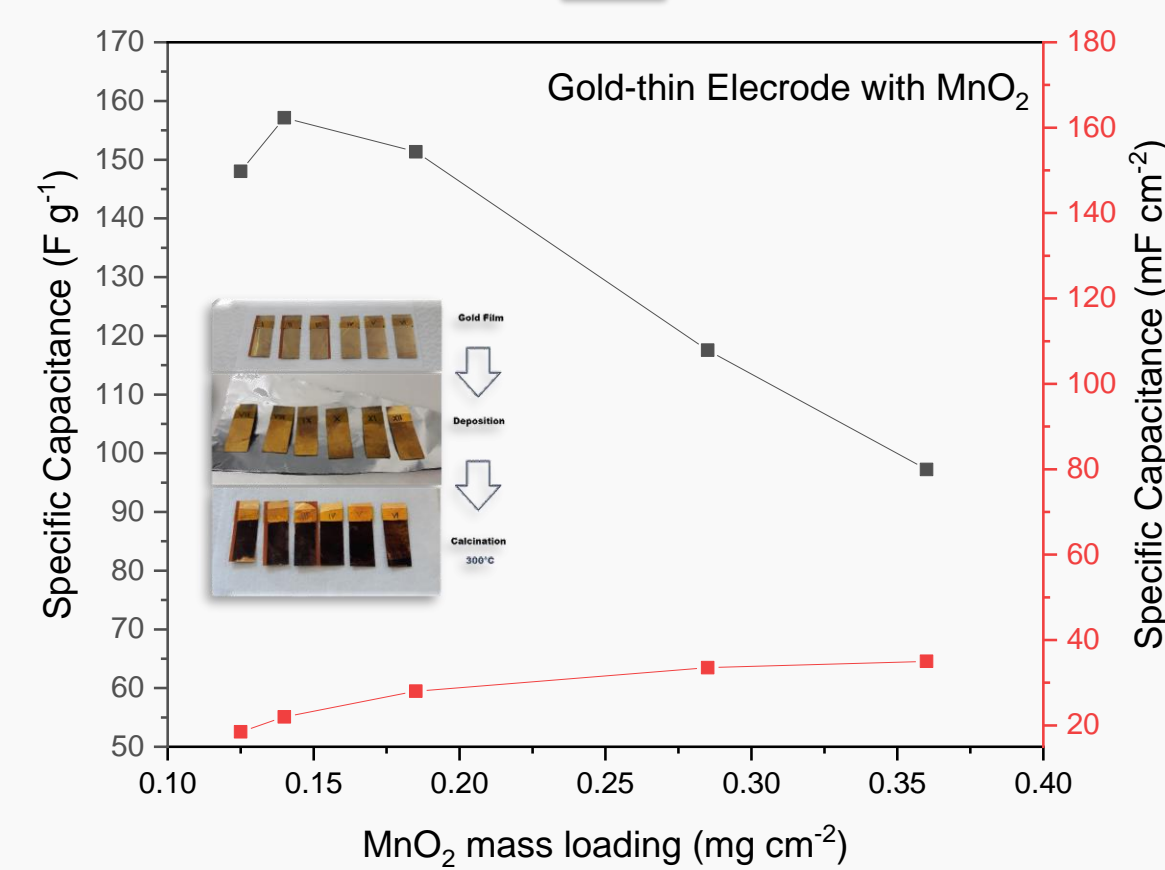


Novel contributions

Understand the Structure

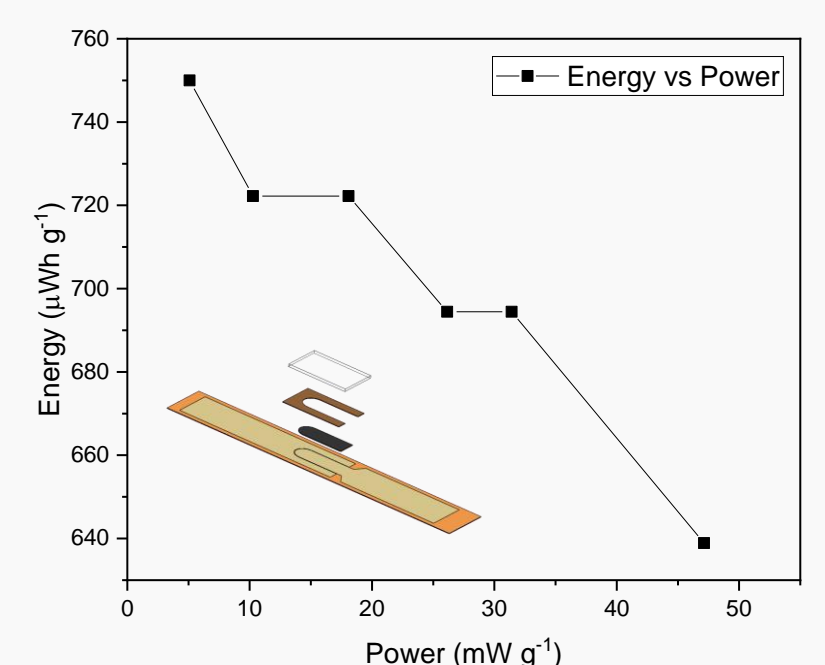
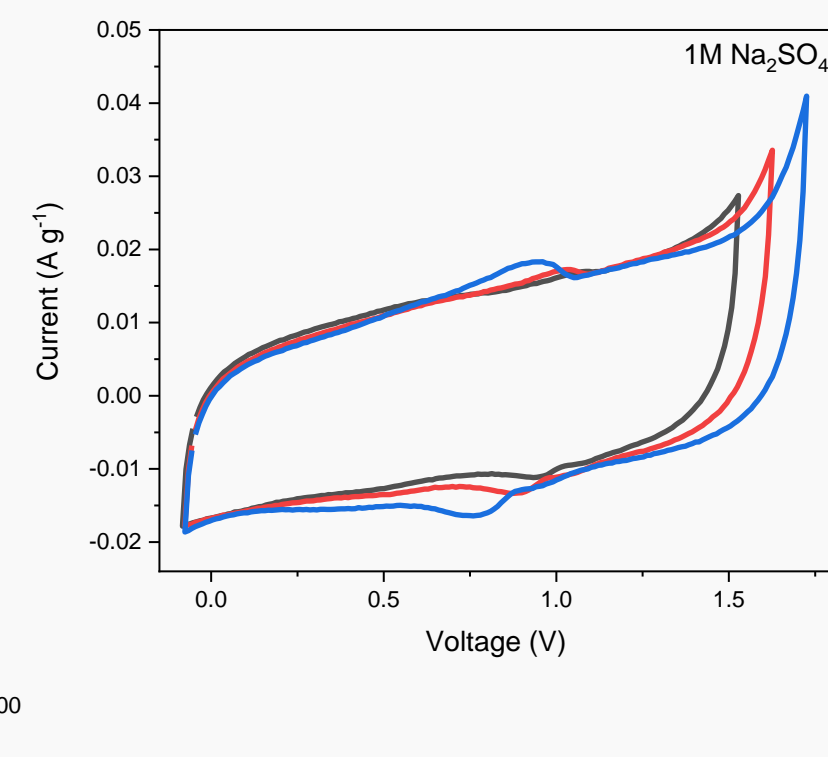
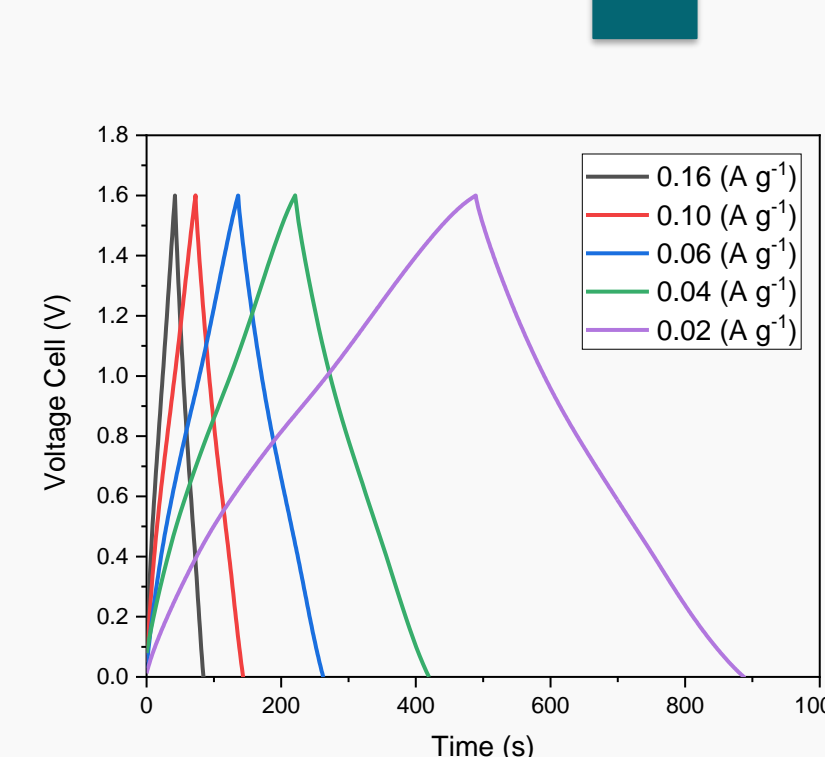


300% of Gain!



Device Performance

Capacitance of about 1 to 5 mF cm² in a 1.6 V window



Future Work

- Are those methods **suitable** for a **scaled-up** production process?
- More **studies** needed on the **interaction** between **manganese** and the dendritic **gold** surface
- Maximize** the **active material covering** during the deposition
- Packaging
- Integration with sensors
- Electrolyte gelification and encapsulation
- Move to On-Chip integration

List of attended classes

- 01UIERP – Advanced elements of chemical engineering (25/02/21, 6 CFU)
- 01UJIRO – Legged robots (12/2/21, 2 CFU)
- 02LCRKG – Fisica di superfici e delle interface (02/04/21, 3 CFU)
- 02ITTRV – Generatori e impianti fotovoltaici 6/5/21, 5 CFU)
- 01RPVKG – Plasma Physics (27/07/21, 6 CFU)
- 01LEVRV – Power system economics (14/07/21, 3 CFU)
- 01LEXRP – Strumenti e Tecnologie per lo sviluppo del prodotto (7/6/21, 5 CFU)
- 01QAAAA – Communication (26/11/20, 1 CFU)
- 01UNYRV – Personal Branding (25/11/20, 1 CFU)
- 01SYBRV – Research integrity (26/11/20, 1 CFU)
- 08IXTRV – Project management (26/11/2020,)
- 01UHJBG – Antropologia Filosofica (07/06/21, 6 CFU)
- 01SIOPG – Didattica, tecnologie e ricerca educativa (14/06/21, 6 CFU)
- INT1397 – Pedagogia della relazione educativa e formativa (13/06/21, 6 CFU)
- INT1399 – Aspetti psicologici dello sviluppo e dell'apprendimento (12/09/22, 6 CFU)

Submitted and published works

- Conference - International Symposium on Enhanced Electrochemical Capacitors, ISEECap 2022. Enhancing the Performance and Mechanically Stability of Planar Hybrid Micro-Supercapacitors Using Dendritic-Gold as Current Collector D. Arcoraci, M. Reina, P. Zaccagnini, A. Pedico, A. Lamberti, F. Pirri