

COMPOSITES MEMBRANE FOR FUEL CELLS BASED ON POLY(VINYL ALCOHOL)

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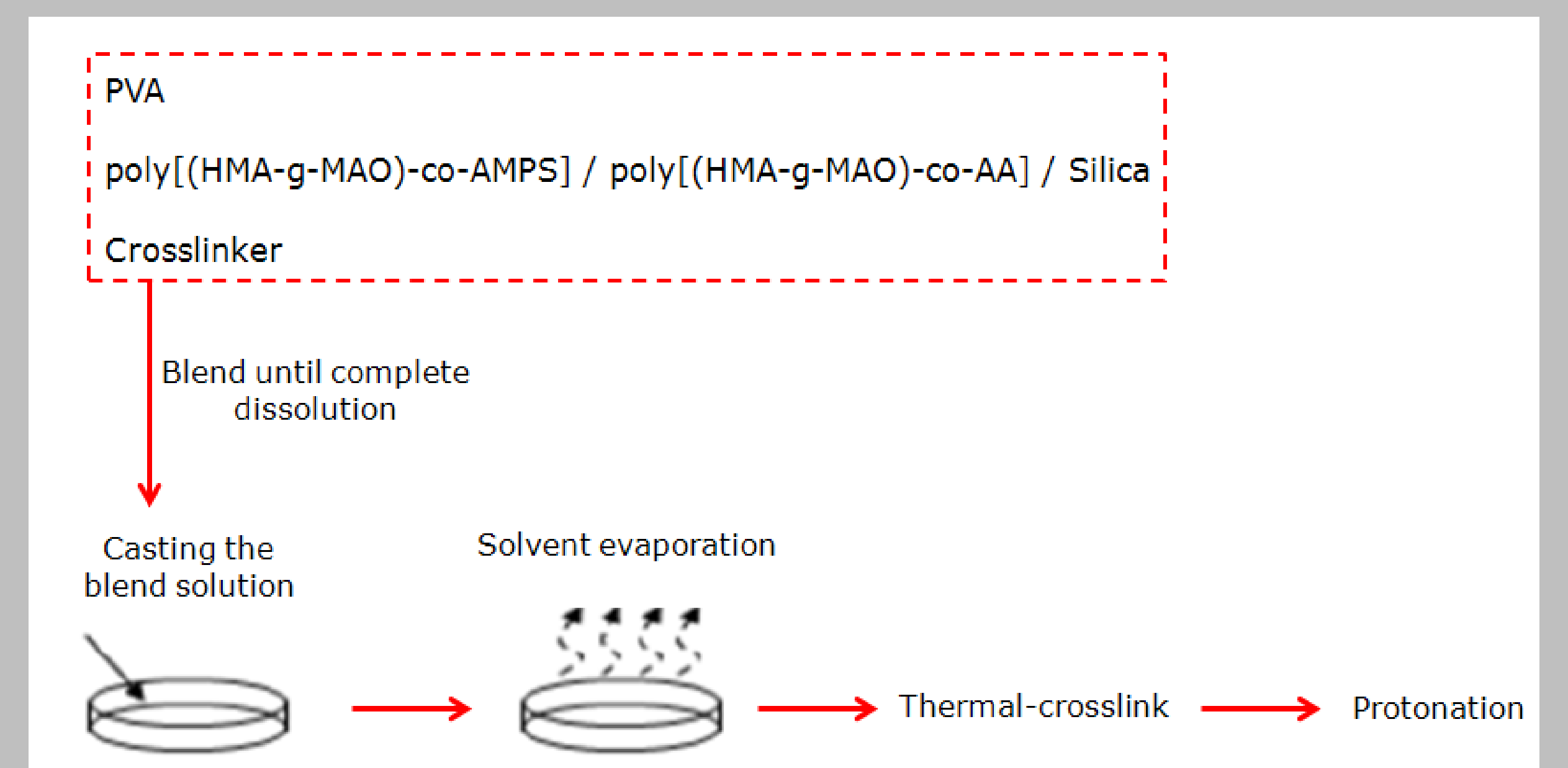
AIM

During recent years, most of the effort in the commercialization of Direct Methanol Fuel Cells (DMFC) and Direct Ethanol Fuel Cells (DEFC) has been focused on designing new polymeric electrolytes with an optimum combination of barrier properties and high proton conductivities. Poly(vinyl alcohol) (PVA) membranes have been used since it has a high selectivity for water to alcohol which effectively reduce the methanol or ethanol crossover through the membrane when used in DMFC and DEFC. Therefore, it can be expected that PVA based composite membranes if optimized properly can serve as a potential alternative polymer electrolyte membrane for DMFC and DEFC applications.

STAGES OF THE RESEARCH AND RESULTS

1. Preparation of the blends

- - Blend the components and addition of crosslinker agent
- - Casting the blend solution onto teflon plate and further solvent evaporation
- - Thermal-crosslink of the blend
- - Blend protonation and purification



2. Characterisation of the blends

PVA

PVA + poly[(HMA-g-MAO)-co-AMPS]

PVA + poly[(HMA-g-MAO)-co-AA]

PVA + Silica

Visual characterisation



- ✗ Rigid membrane
- ✗ Fragile, the membrane breaks



- ✓ Flexible membrane
- ✗ Phase dispersion is observed

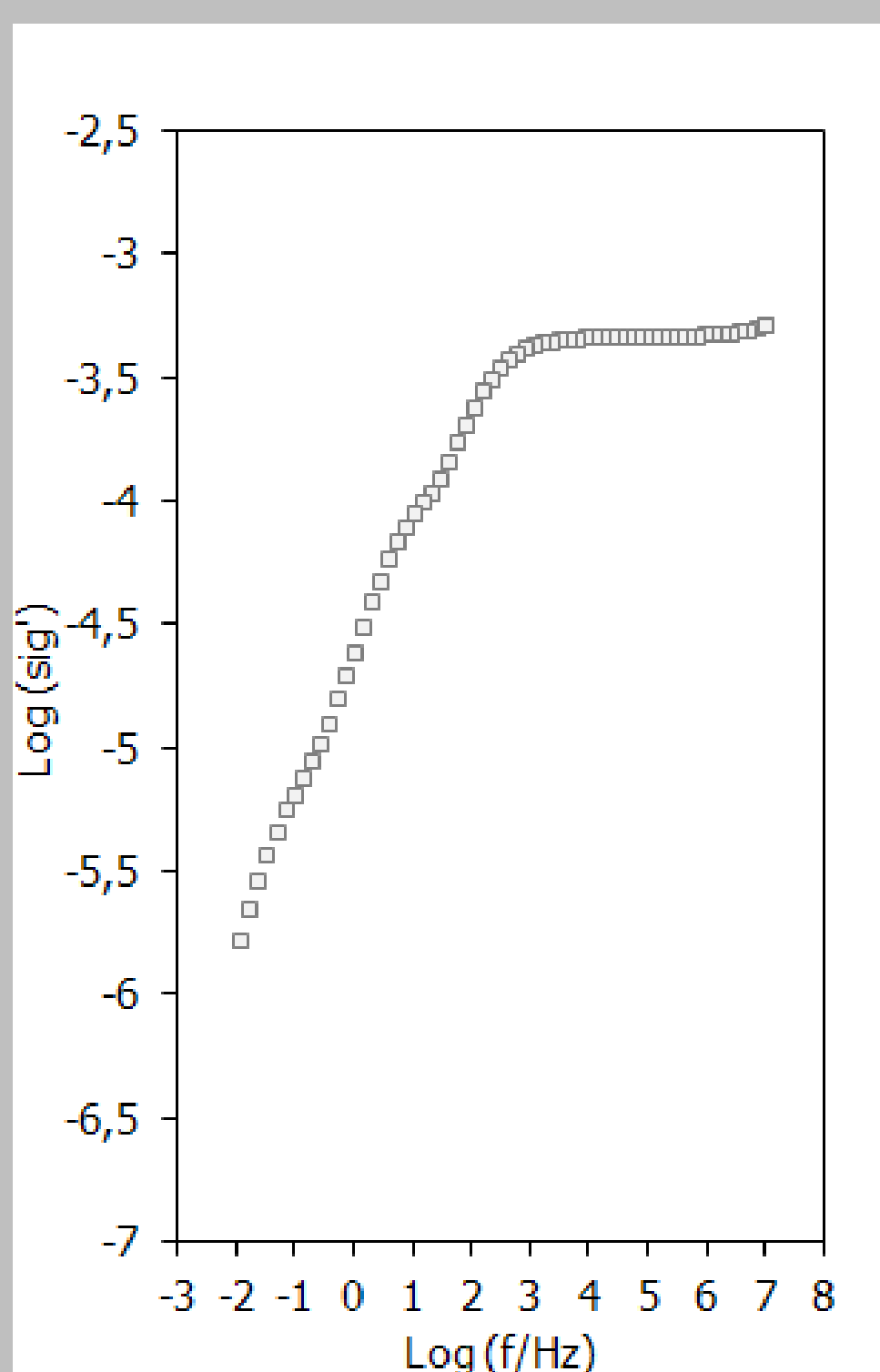


- ✓ Flexible membrane

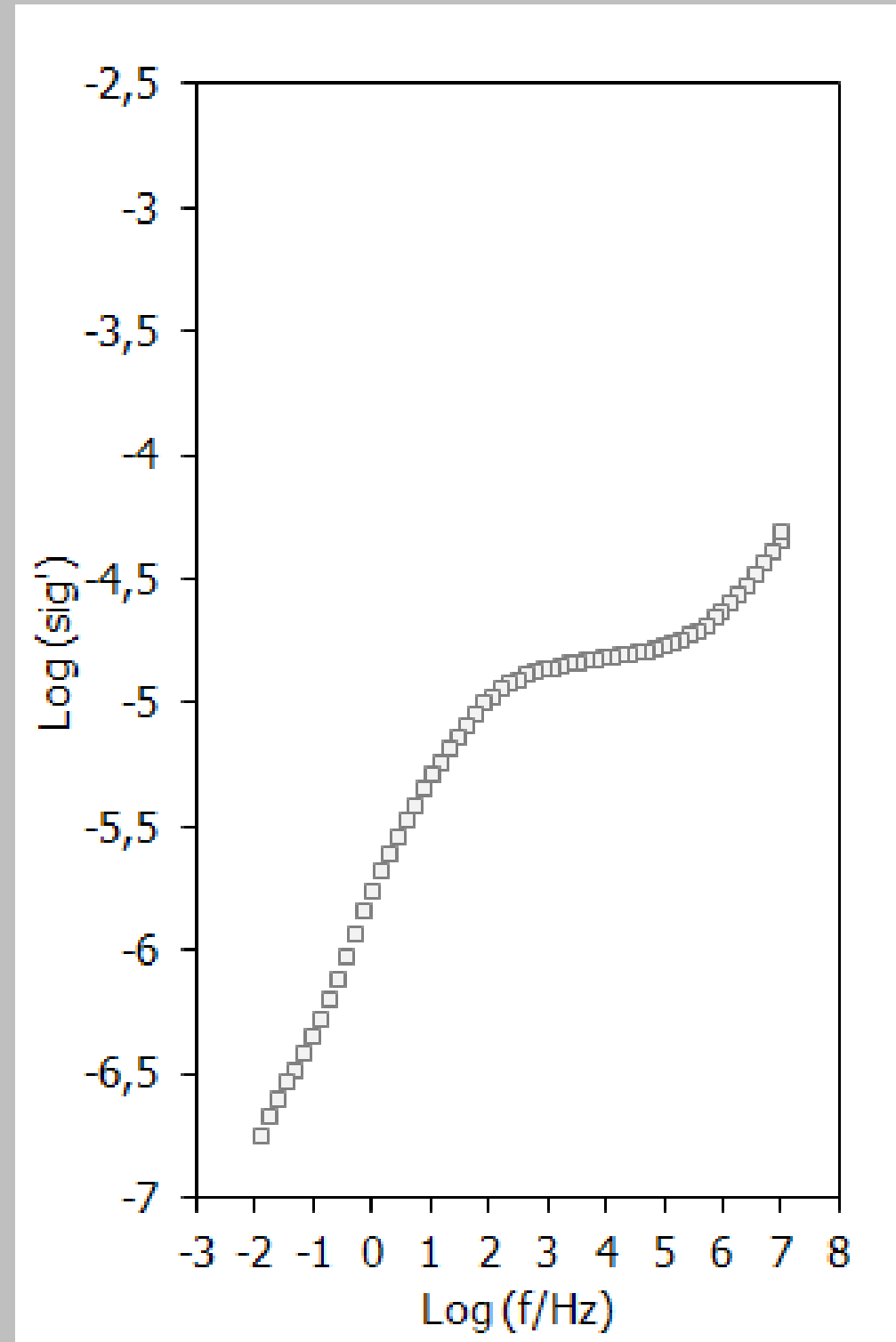


- ✓ Flexible membrane

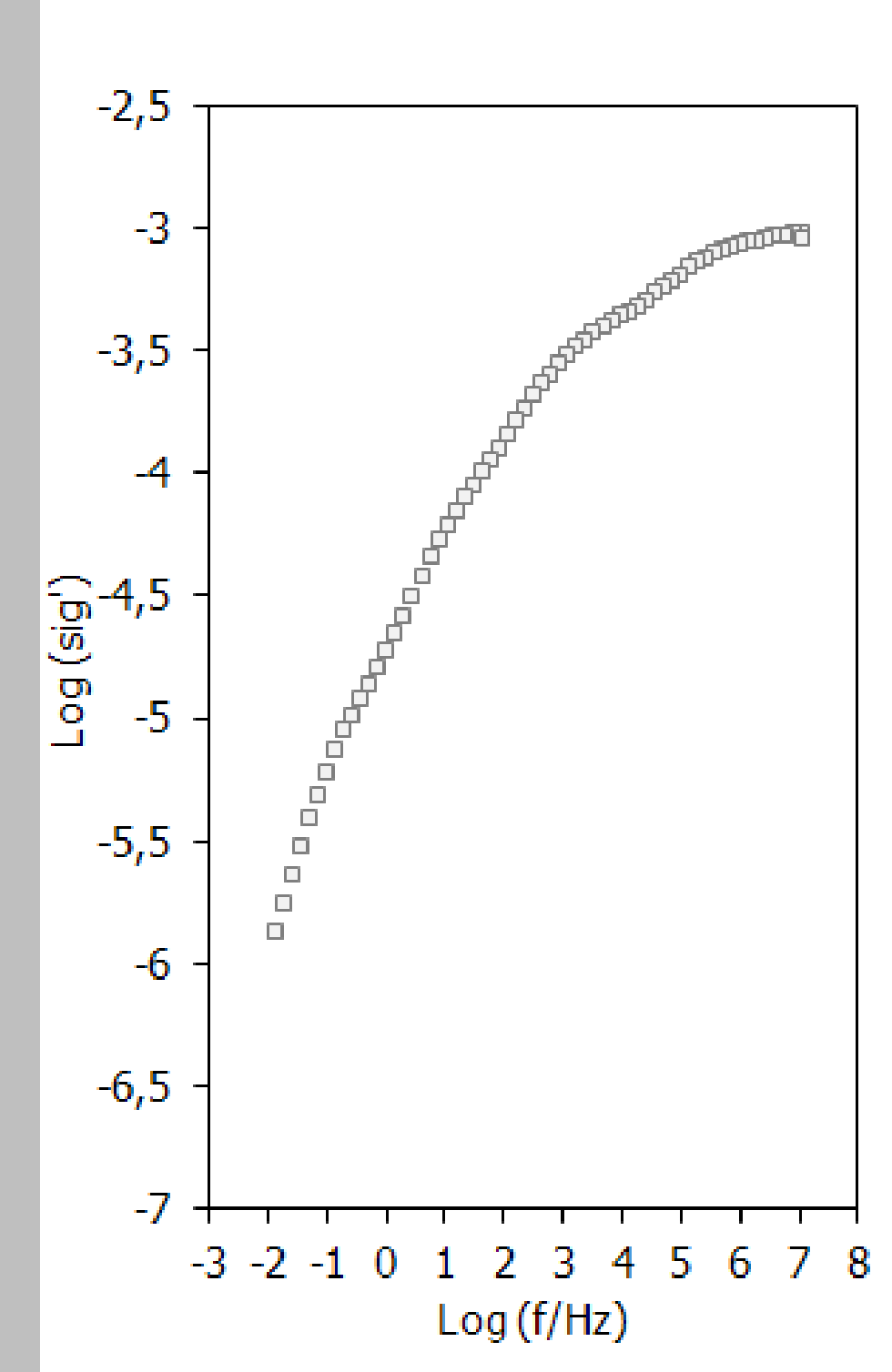
Conductivity measurement



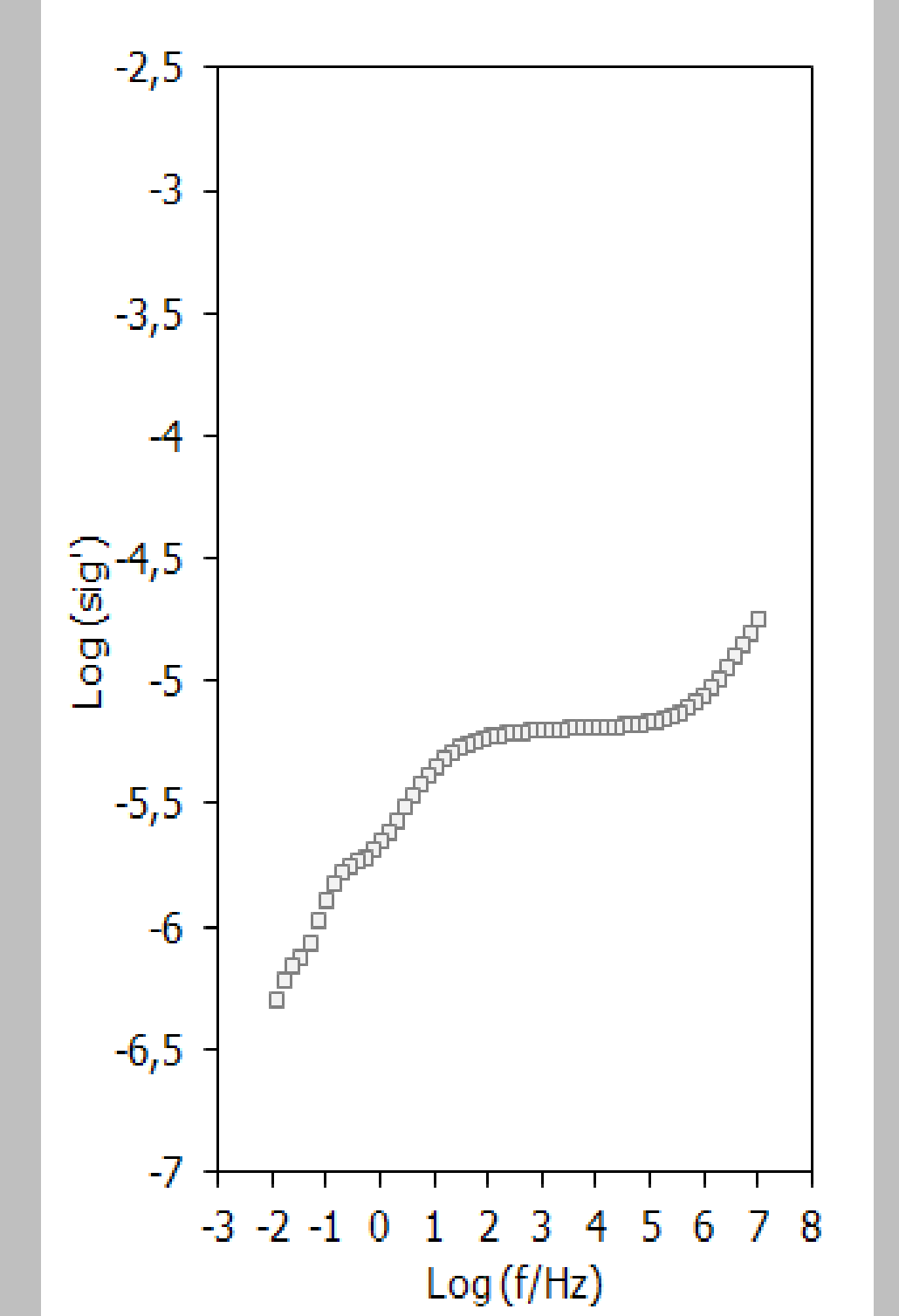
✓ $\sigma < 10^{-3} \text{ S} \cdot \text{cm}^{-1}$



✗ $\sigma \sim 10^{-5} \text{ S} \cdot \text{cm}^{-1}$



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ACKNOWLEDGES

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