Development of new a material for sea water substructures by seawater electrolysis

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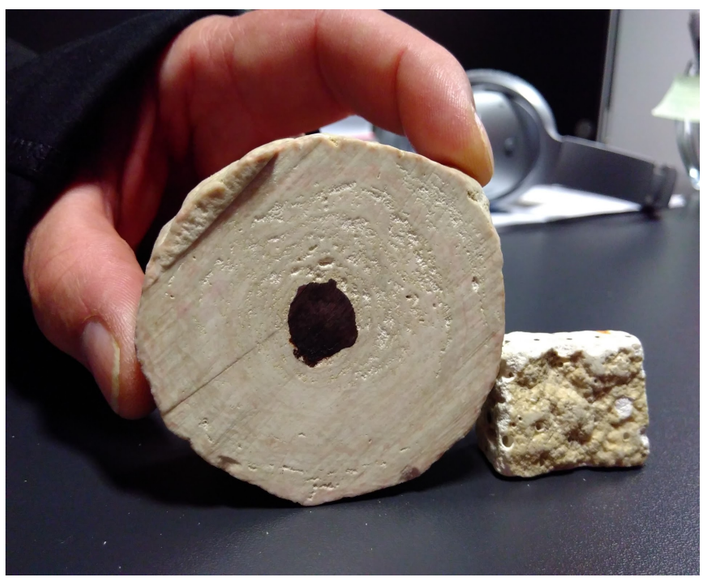
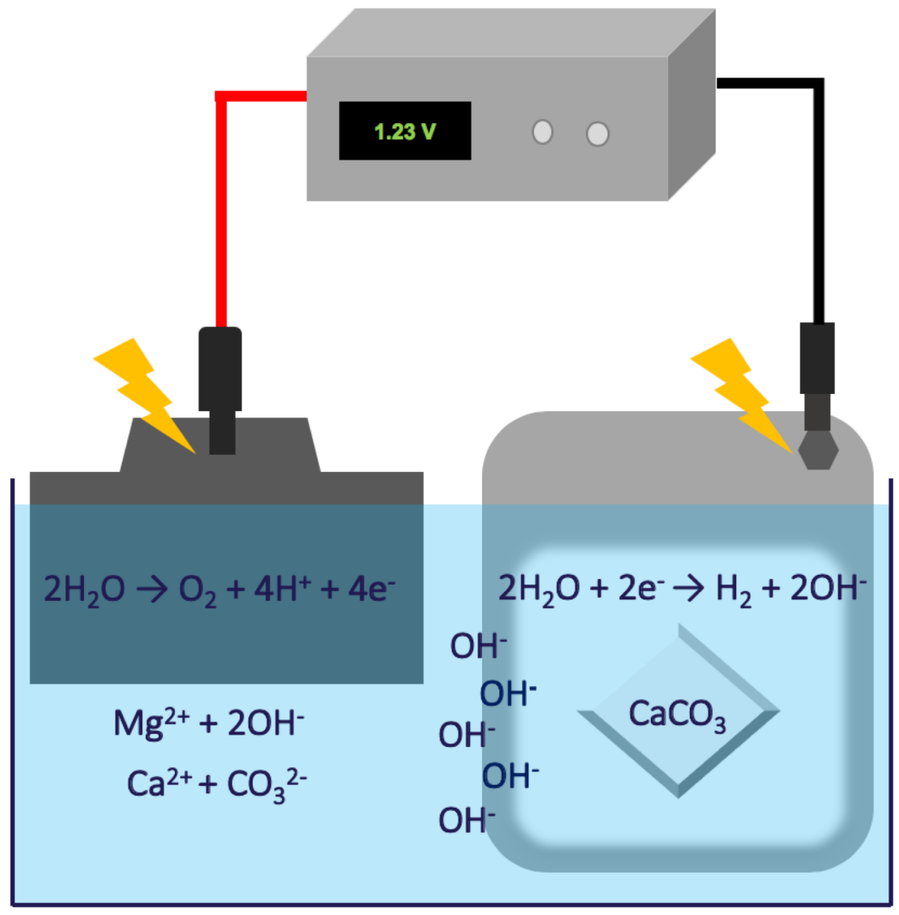
01 INTRODUCTION

A NEW, INNOVATIVE MATERIAL

The aim of this study is to investigate the applicability of a material made by seawater electrolysis as a subsea **construction material** for green offshore energy structures.



02 BACKGROUND



03 METHOD

ELECTROLYSIS OF SEAWATER

The process is based on **electrolysis** of seawater. When immersing a pair of electrodes in seawater and applying a relatively small electric voltage, the water molecules close to the electrodes will be split into hydrogen and oxygen according to the following equations [1]:

Anode reaction

$$2H_2O \rightarrow O_2 + 4H^+ + 4e^-$$

Cathode reaction

$$2H_2O + 2e^- \rightarrow H_2 + 2OH^-$$

MINERAL ACCRETION

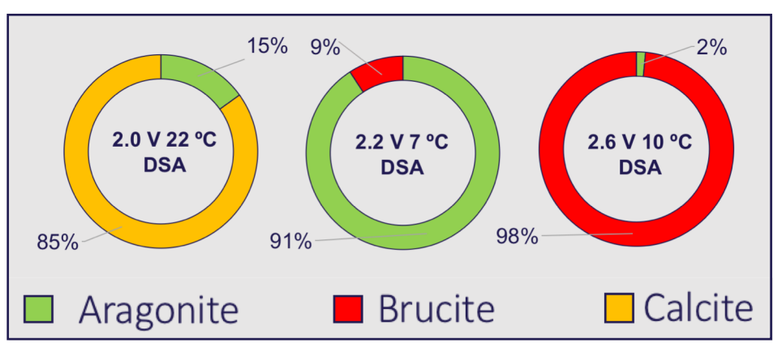
Among the ions dissolved in seawater calcium ions (Ca^{2+}) and carbonate ions (CO_3^{2-}) are of interest for mineral accretion by seawater electrolysis.

Calcium carbonate ($CaCO_3$) form two polymorphs in seawater, **aragonite** or **calcite** depending on factors like temperature and ion concentrations.

At relatively high voltages a softer material, magnesium hydroxide ($Mg(OH)_2$, **brucite**) can precipitate [2].

MINERAL COMPOSITION

An initial voltage interval for **electrodeposited** material has been established experimentally, indicating that only a **narrow range** of voltage will result in deposition of $CaCO_3$.



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