



**duratiNet**

**Activity 6**

**“Green” and smart structural materials  
repair products and systems**




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ATLANTIC AREA  
Transnational Programme


**duratiNet** 2<sup>nd</sup> Transnational Workshop  
QUB, Belfast 22-24 June 2009 

**A6.1 Concrete mixes with sub-products and recycled aggregates  
(Univ. Bordeaux) (Fr)**

**A6.2 Rebars more resistant to corrosion (SS, fibers)  
(Univ. Vigo) (Es)**


**A6.3 Smart structural materials (Coatings, Permanent monitoring)  
(QUB) (UK)**

**A6.4 New materials and systems for steel protection  
(LNEC) (Port)**



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## Objective

### Critical review on:

- the use of “green” concrete mixes for new or repaired structures.
- the use of structural materials with improved durability.
- the use of intelligent structural materials with active properties.  
(self cleaning concrete, coatings, permanent monitoring systems)
- the use of more resistant reinforcement materials than carbon steel.

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“Healthy”  
rebar



- pH 11-13
- Low [Cl<sup>-</sup>]
- Low RH
- High Resistivity

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- Low pH (< 10)
- High [Cl<sup>-</sup>]
- High RH
- Low Resistivity

"Ill"  
rebar

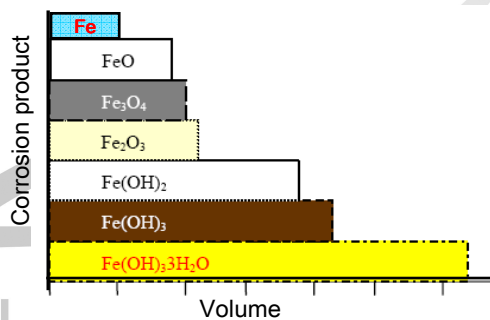
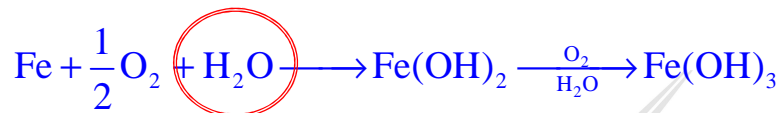


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**Chemistry involved**



Large differences in specific volumes  
 ⇒ spalling

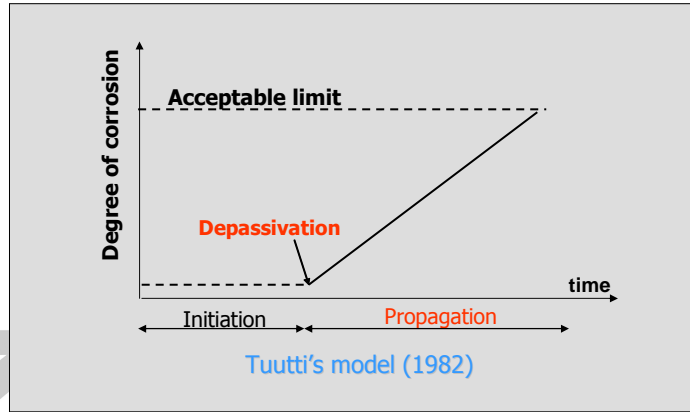


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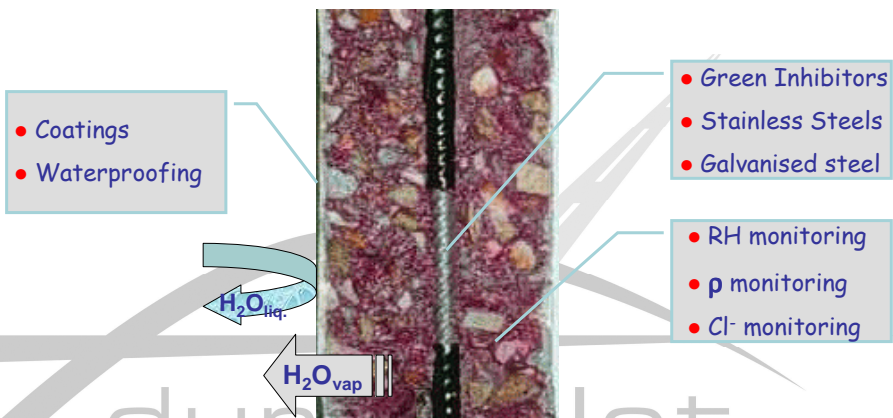
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Some Chemistry

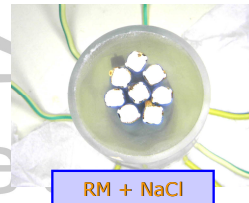
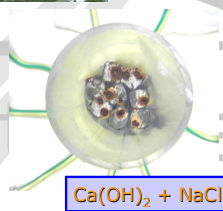
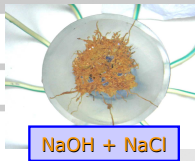


Objectives





**RM world production 80 M tpy**

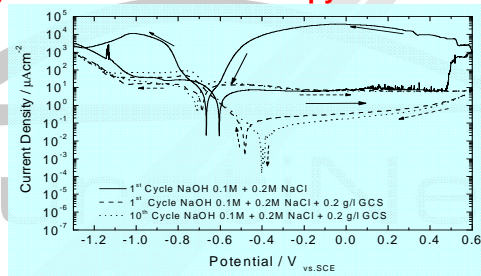


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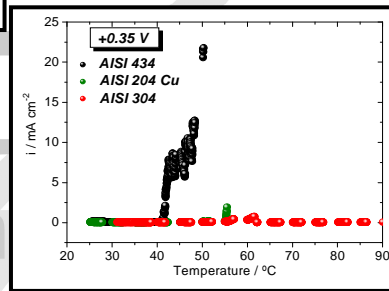
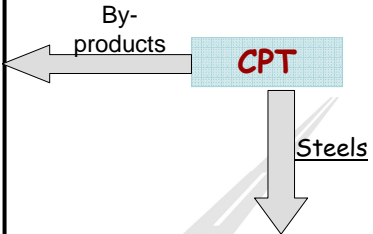
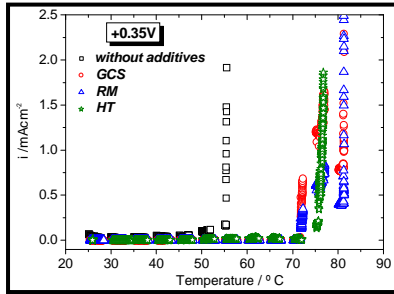
**Granite cutting slurries. Galicia: 0.3 M tpy**



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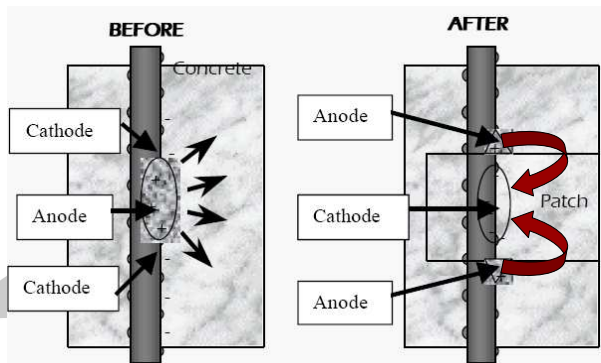




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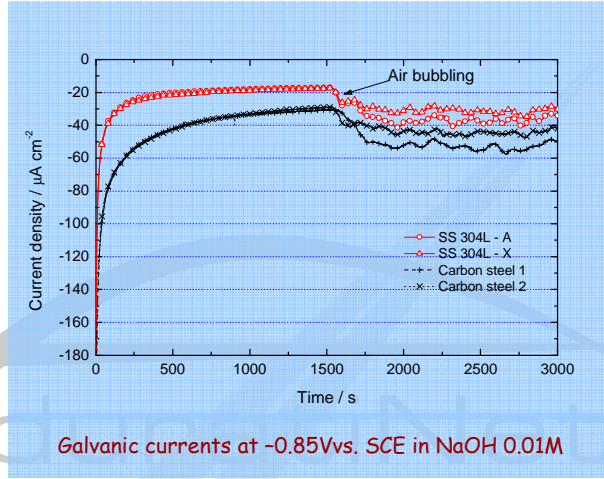
### Galvanic effects



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### Galvanic effects



Galvanic currents at  $-0.85\text{Vs. SCE}$  in  $\text{NaOH } 0.01\text{M}$