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Modeling of Electrochemical Channels*

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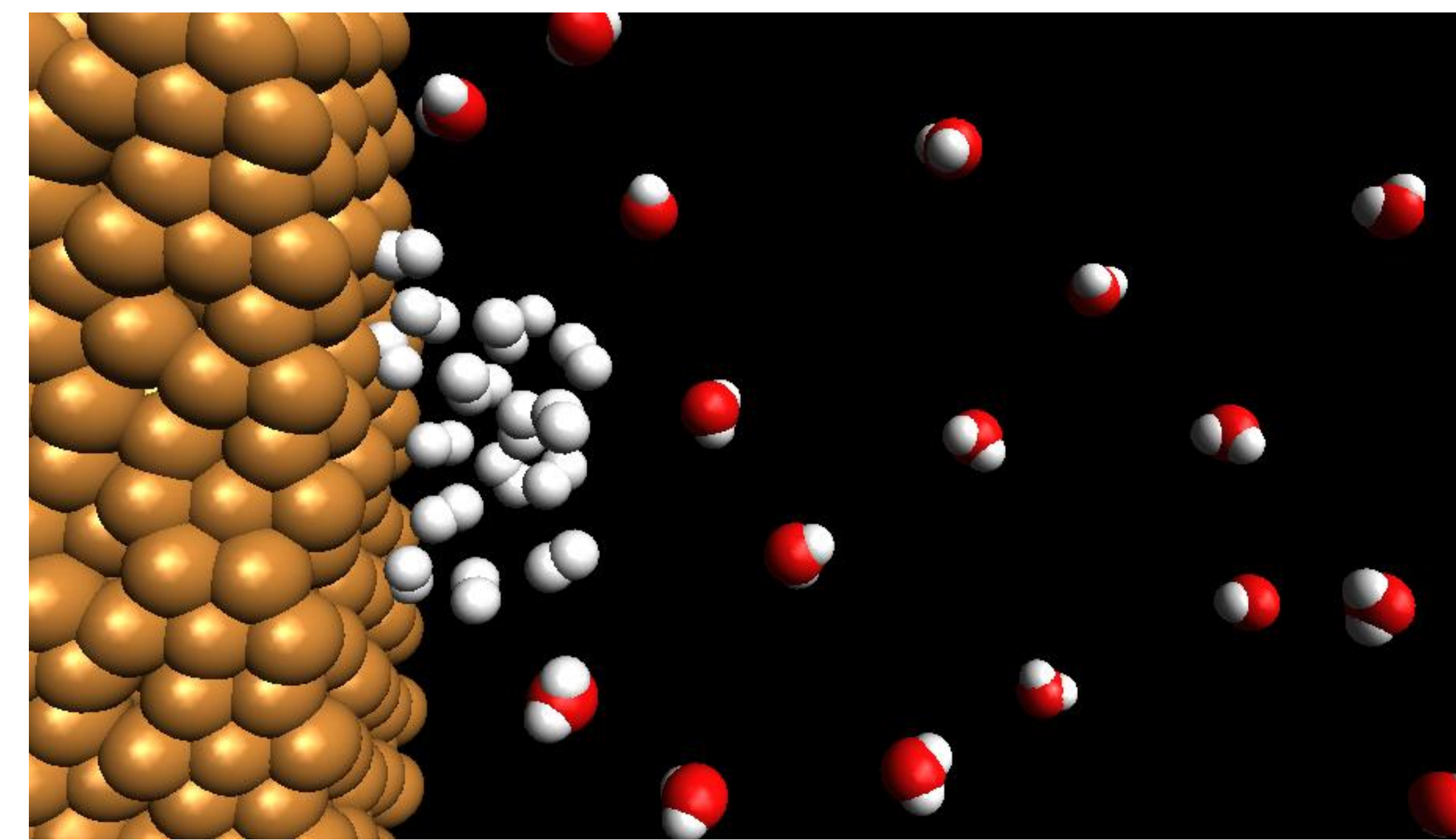
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*see CREL Report 2010, pages 51-53

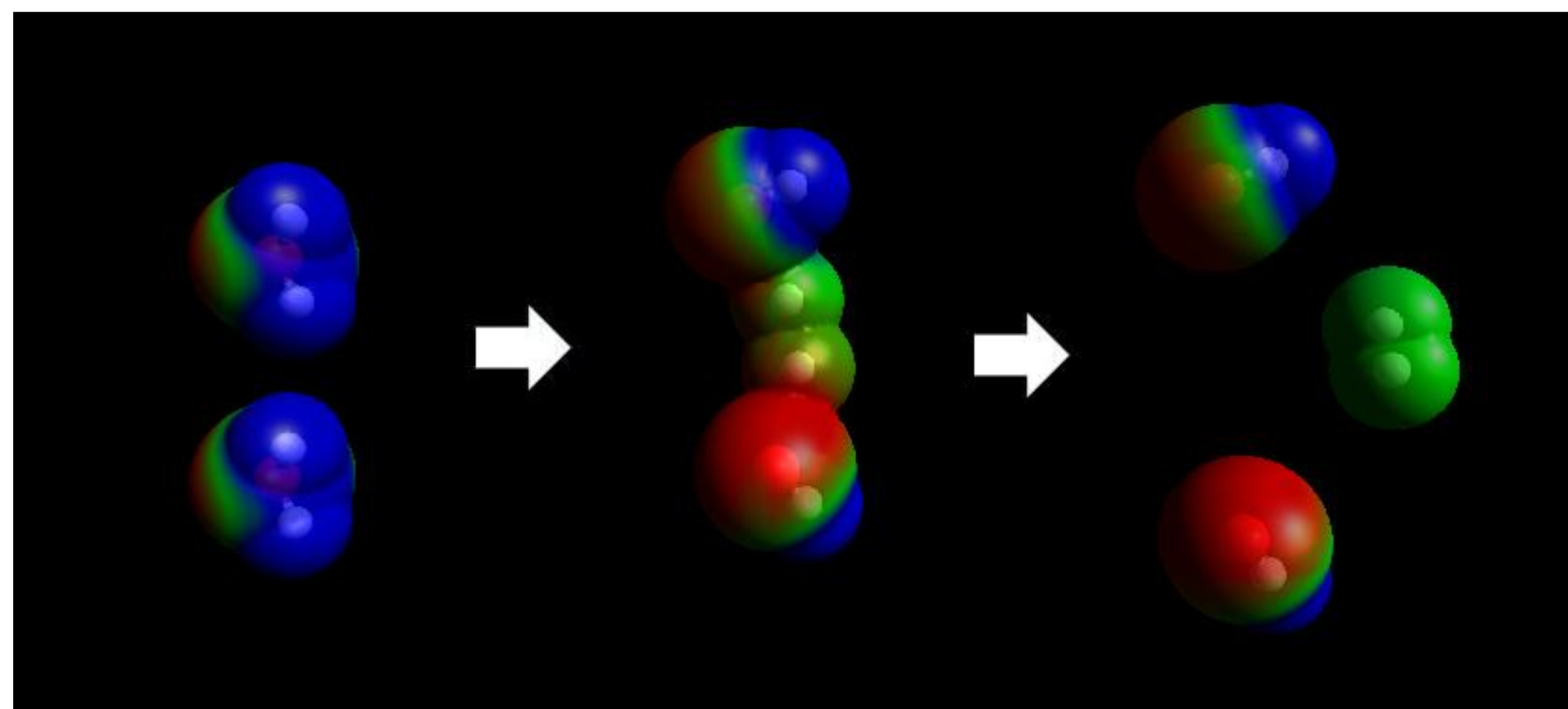
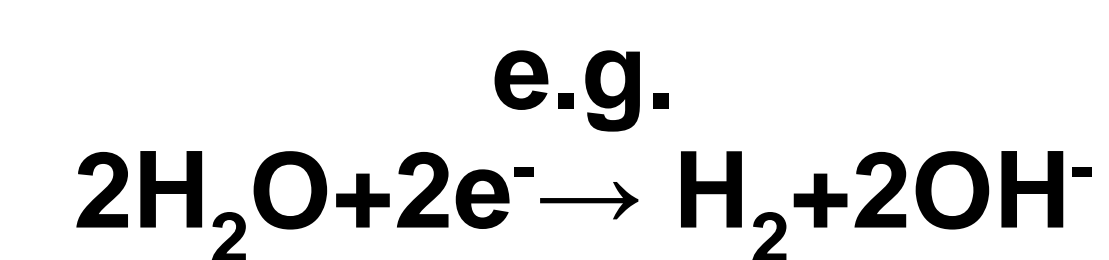
Bubble Formation



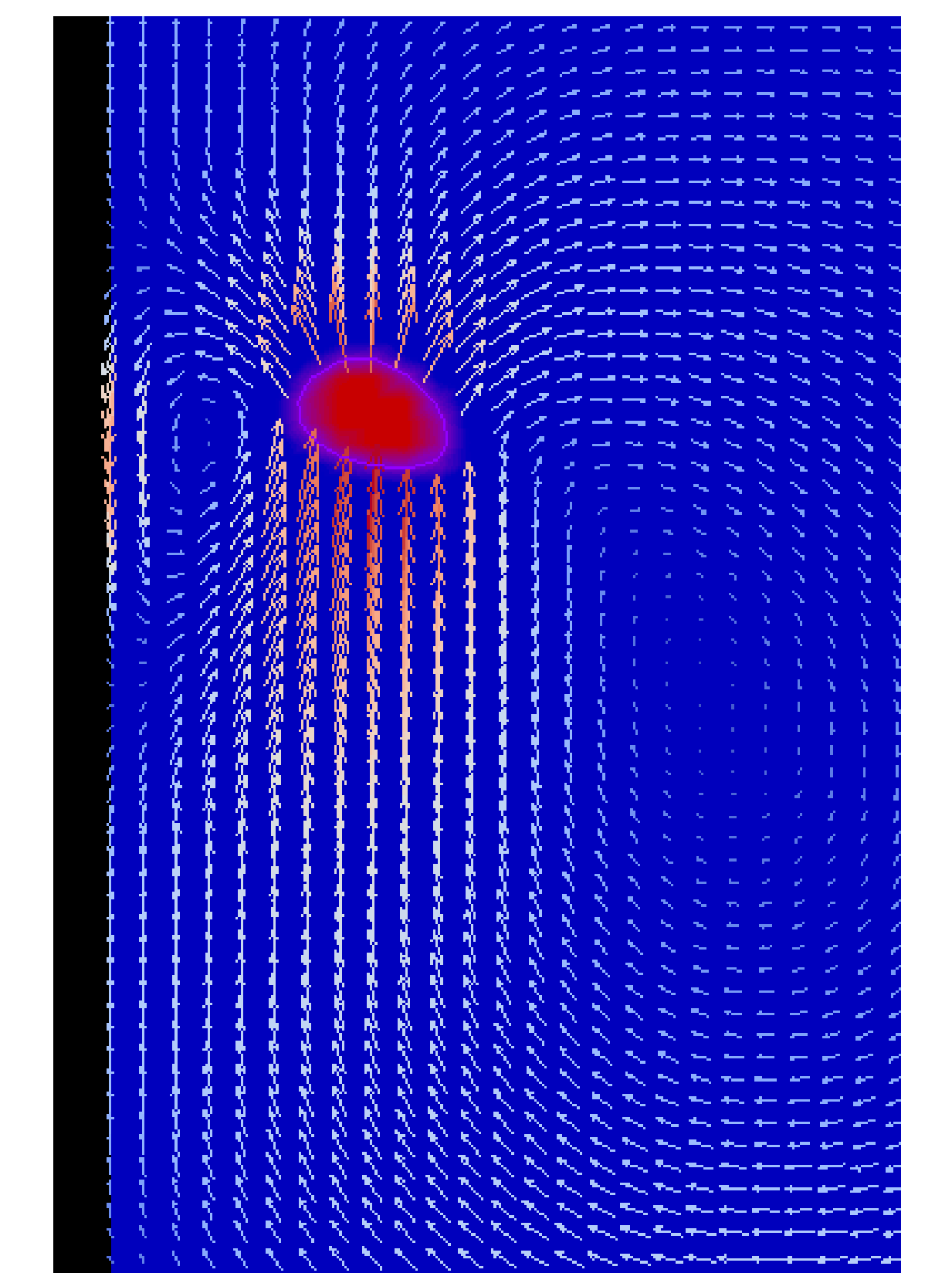
The electrochemically produced hydrogen accumulates at certain locations on (or near) the electrode and generates bubbles.

The rising bubbles exchange momentum with the surrounding liquid.

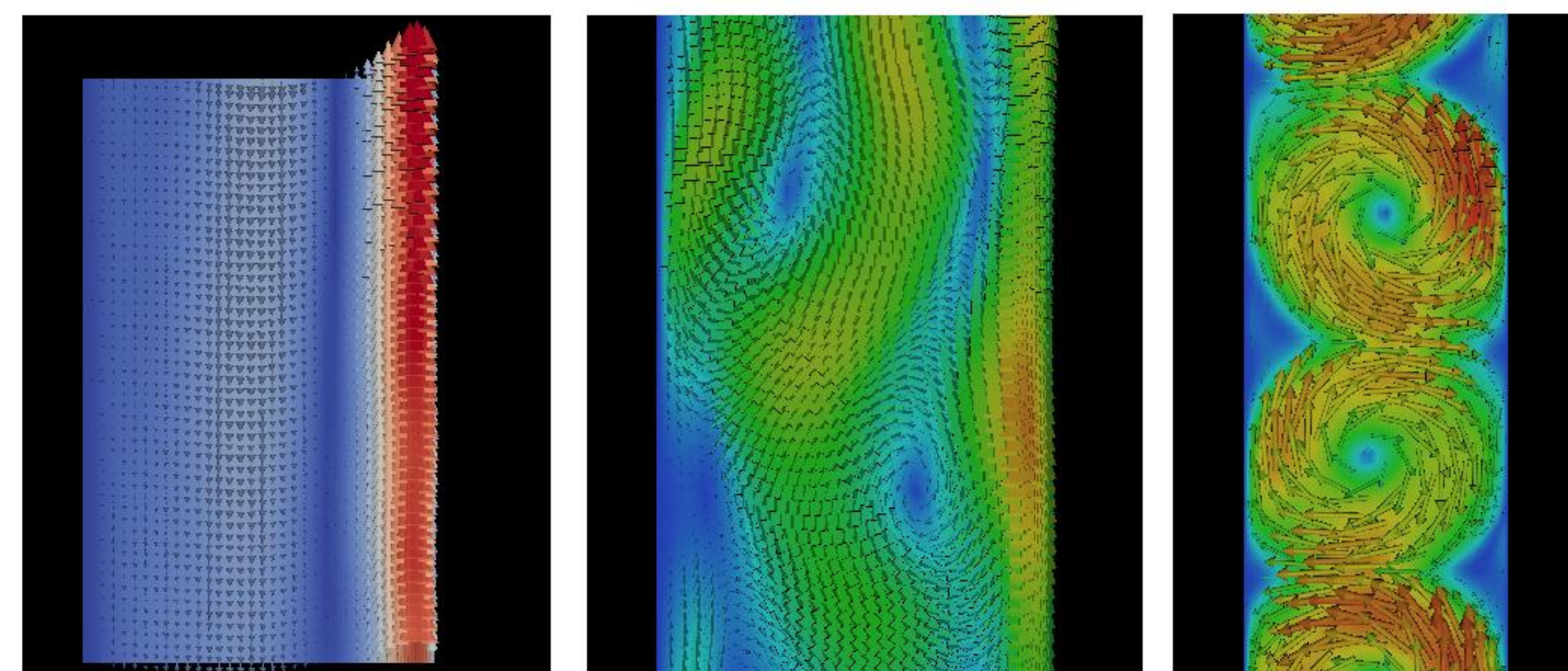
Chemical Reaction



Momentum Exchange



Fluid Dynamics



Quasi-steady

Transitional

Pseudo-turbulent

Mixing and, consequently, local concentration of the reactants are very different in these patterns. Therefore, the reaction yield is affected by the fluid dynamics of the system.

Depending on the size and number of bubbles (i.e. the current density), we have three flow regimes: quasi-steady, transitional or pseudo-turbulent.

Knowledge of the fluid dynamics of the system can allow us to associate certain electrochemical reactions with specific fluid patterns in order to maximize the yield of some reactions and, conversely, to minimize unwanted or side reactions.