The University of Nottingham
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Advanced Materials Research Group
project summary

Project Title	Design of Thermal Energy Storage Systems
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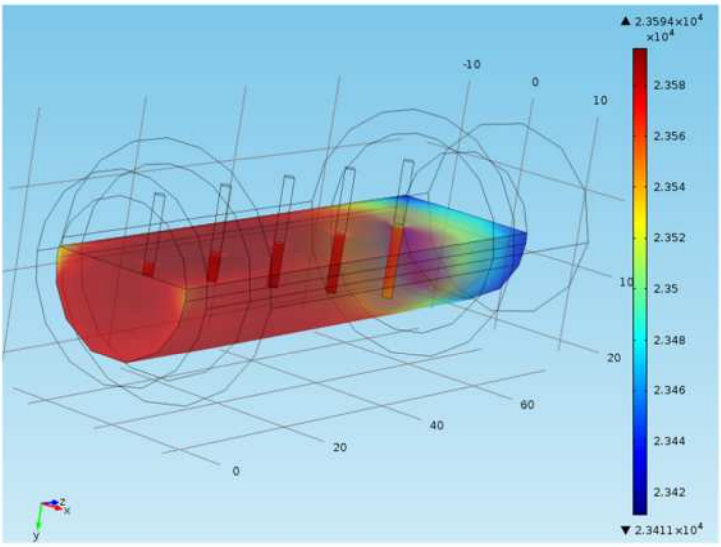
Project Summary	Currently working on the design of a thermal energy store that will demonstrate the feasibility of using hydride based technology in commercial solar power plants. The store acts as a buffer allowing the heat collected during daylight hours to be available to generate electricity during evening peak demand. The technology employs the same chemical reaction that is used to store hydrogen in metal hydrides as an alternative to pressurised storage. Solution of Multi-physic Problems using Numerical Modelling Techniques Numerical solvers are an important tool in engineering and can be used to model the behaviour of a wide range of physical processes. A multiphysics solver allows models that represent systems that contain interconnected physical processes to be resolved. For example the highly reversible reaction of a metal hydride with hydrogen in a reactor requires the simultaneous solution of mass and heat transfer phenomena.

3D Numerical Model Simulating Thermal Energy Storage Processes

After eight seconds the metal hydride bed has taken up hydrogen and released heat. The coloured plot shows the concentration of hydrogen chemically bonded in the metal.



High concentration of hydrogen
[mol/m^3]

Low concentration of hydrogen
[mol/m^3]