

# Electrical Behaviour of a Li-ion Polymer Battery

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## Abstract

### Introduction

Lithium batteries have made substantial and significant gains in the last 30 years from becoming a curiosity to becoming the dominant rechargeable battery for consumer portable applications. However, the next market opportunities will be much tougher to conquer as they mostly demand higher power capabilities at lower costs.

### Use of COMSOL Multiphysics®

With a view to estimating electrical characteristics of a Polymer Li-ion Battery during specific charge and discharge conditions, a COMSOL Multiphysics® model has been developed that accounts for electrochemical phenomena inside the device. In order to accomplish that, the Battery and Fuel Cells Module has been used. Cell model has been created using the Li-Ion Battery interface, customizing material properties and electrochemical reactions. The electrochemical parameters required for the calculation have been determined by laboratory tests, manufacturer datasheets and literature survey.

The model has been verified by voltage/amperage measurements by means of a commercial Battery Testing System (CADEX C8000). These tests have provided a more realistic approach of electrochemical mechanisms inside the device.

### Results

Results indicate that the model is able to predict accurately not only the electrical behaviour of the device under specific operating conditions but also the influence of the materials involved, geometric aspects and other relevant boundary conditions in battery performance.