

- (1) For current collectors in lithium-ion cells copper foil is used for the negative electrode and aluminum foil for the positive. Often the aluminum foil is about 1.5 times as thick as the copper. Why in your group why this is likely done? You may need to look up some relevant materials parameters for the two materials.
- (2) Using data below, determine charging and discharging resistance of the cell. The answer should be in $\Omega\text{-m}^2$. Compare these values with the ohmic resistance of the same cell. Discuss why the values are different.

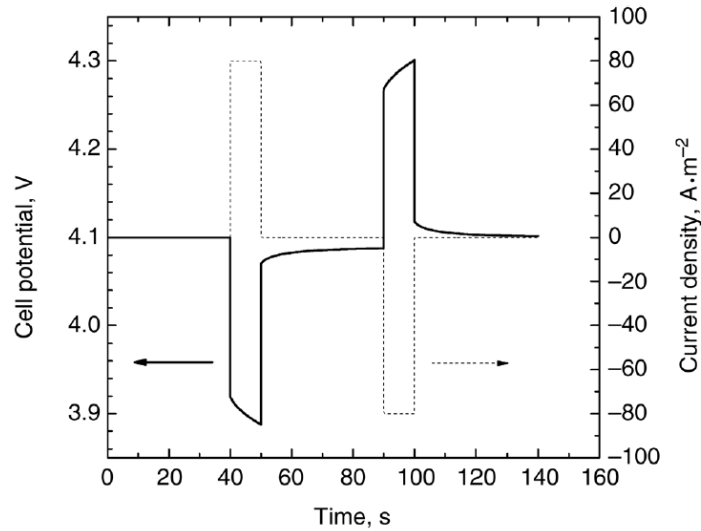


Figure 8.12 Pulse power test.

- (3) Consumers desire to charge their electric vehicles as quickly as a conventional car can be refueled. If time for refueling with gasoline is about 2 minutes, at what C-rate would the battery need to be recharged in the same period? For a 50 kWh battery, what power corresponds to this rate? Frequently, researchers report extremely high rates of charge and discharge for tiny experimental cells, typically with very thin electrodes. What challenges exist in translating these results to a full-sized electrical vehicle battery?