* Ions move across the electrolyte from the (relatively) positively charged anode to the (relatively) negatively charge cathode. This is due to the differences in the concentration of protons
* Charge transport occurs at a voltage loss
* Voltage required for charge transport at a rate of *i* (ohmic loss):
* Ohmic loss can also be written as , although the ionic contribution to Rohmic tends to dominate
* ASR is an area normalized resistance, where it is the product of the area and the resistance
* It is ideal to have as low a ohmic resistance as possible, and this thus led to the exploration of using better electrolytes with better ionic conductivities (polymers, ceramics, etc.) to aid ions transport.
* Thickness of the electrolyte also contributes to increasing the resistance. Therefore, efforts have been made to have as thin an electrolyte as possible.
* This, however, is limited by several limitations listed in page 121. The most crucial limitation is the phenomenon of fuel crossover, where the different fuels are mixed due to the thin electrolyte resulting in additional reactions which may decrease the emf.
* Electronic conductivity in metal
  + Ohmic resistance arises from the deflections in electron pathways
  + Mobility of the electrons, u, is modelled by equation 4.20
  + This gives rise to the expression for conductivity as seen in equation 4.21
  + Conductivity is high (in the order of 106-108)
* Ionic conduction in solid electrolyte
  + Ionic conduction occurs via ‘hopping’ through vacancies
  + This effectiveness of hopping is characterized by the diffusivity (equation 4.22)
  + Overall mobility and conductivity can then be derived (equation 4.23 and 4.24)
  + The carrier concentration, c, depends on the density of the mobile defect species and this can be increased through doping
  + Conductivity is low (in the order of 10-4-102)
* Ionic conduction in aqueous electrolytes or ionic liquids
  + Need to compare the driving force (electric force in equation 4.25) with drag force in liquid (equation 4.26)
  + Equating the above two equations allows us to determine an expression for mobility, and subsequently the conductivity as well
* Ionic conduction in Polymer Electrolytes
  + H+ often gets transported via a H2O carrier (i.e. drags 1-2 water molecules along with it). This process is often facilitated by SO3-
  + Empirical relation between λ and water vapour activity is shown in equation 4.34
  + Apart from the water content, conductivity is also a function of temperature. This is represented by the empirical relation in equation 4.38
  + However since λ is a spatially dependent variable (i.e. non-uniform throughout medium), there is a need to have some sort of a function of distance to better represent λ. This spatially dependent property of λ is taken into consideration in equation 4.40
  + The drag coefficient shows the degree to which proton movement causes water movement, and this can be used to compute the water flux, JH2O,drag (equation 4.41 and 4.42)
  + This thus implies that water will be transferred to one end due to the movement of the H+ ions. At the same time, water will also be produced at that end. This results in a higher concentration of water at one end, which in turn leads to the back diffusion of water. This phenomenon, coupled with the expelling of water as a product, forms what is termed ‘Water Management’