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Primary lithium batteries passivation characteristics and effects in LiSOCl₂ chemistries

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Passivation is a phenomenon for lithium battery; a thin chemical film appears on the surface of lithium anode and prevents it from oxidation which is forming on the surface of the metal. In lithium-thionyl chloride battery, thionyl chloride is a liquid. Lithium anode gets in touch with thionyl chloride and the oxidation reaction will start slowly. The outcome of this oxidation is lithium chloride. The lithium chloride which is formed on the surface of the lithium anode is very small and it prevents the chemical reaction between lithium and thionyl chloride. This phenomenon of lithium is called as Passivation. The passivation in lithium thionyl chloride batteries starts as soon as the batteries are manufactured, but the reaction is not fast. The passivation is directly proportional to the temperature. With the increase in temperature, the rate of passivation increases. The passivation is more dangerous as longer the time is. Passivation is the intrinsic characteristics of lithium thionyl chloride battery. It is impossible to store lithium thionyl chloride batteries without passivation. The lithium chloride is formed on the surface of the lithium anode in thionyl chloride is very dense which prevents the reaction between lithium and thionyl chloride. Because of passivation the self-discharge rate inside the cell becomes very small. By this way, we can achieve the shelf life of 10 years for lithium thionyl chloride batteries. This is the positive sign of passivation. Passivation protects the battery capacity and prevents it from capacity loss. In this presentation, we are going to deliver how to save batteries from getting passivized and how it can be depassivized.

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