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Comparative analysis of Thermal insulating material in Lithium ion batteries used in EV's

Kavita Mhaskar[1], Piyali Mondal[2]
[1](Department of Electrical Engg, VIVA Institute of Technology/ University of Mumbai, India)
[2](Department of Electrical Engg, VIVA Institute of Technology/ University of Mumbai, India)

Abstract: *The treading technology of electric vehicle are all coming up with lithium ion batteries with increased capacity and ability to give more range. This paper investigate all the type of thermal insulation interface material with ability to absorb maximum and radiate minimum. Also cost estimating of all type of materials are discussed in this paper for helping in selection of appropriate material.*

Keywords -*Electric vehicle, LI batteries, Thermal insulation, Thermal conductivity, Heat*

I. INTRODUCTION

Improvements are being made to the lithium-ion batteries used in electric vehicles. Car makers are developing more powerful lithium-ion batteries that have increased range and charge more rapidly. Along with these improvements, enhancing safety is becoming increasingly urgent for electric vehicle development.

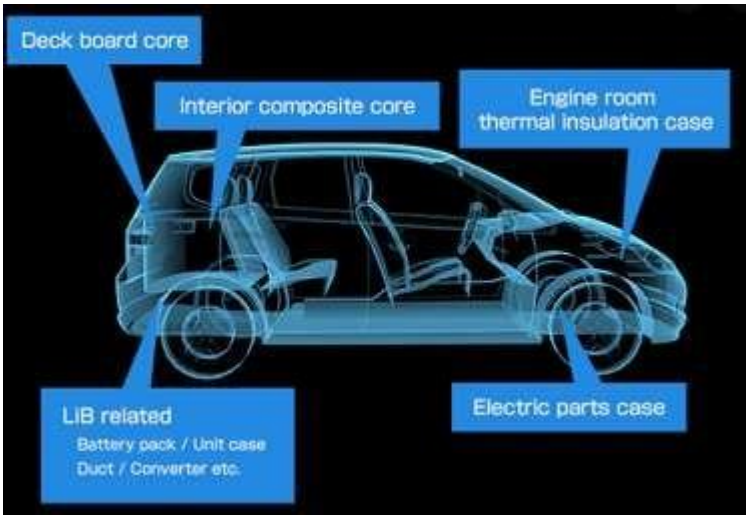

Figure 1: Structure of EV

Li-ion batteries produce a significant amount of heat while in use and while charging. Along with the use of thermal management materials, placing protective engineered flame retardant insulating materials between the components of the battery cell, module, and pack can offer additional thermal and electrical insulating protection. However, adding such materials can be challenging due to space and weight constraints.

II. POLYPROPYLENE ELECTRICAL INSULATO MATERIAL

Formex™ is a top choice for engineers and designers. It is highly durable with excellent dielectric strength. It is also flame retardant (UL94 V-0) meeting strict safety and environmental requirements. Formex™ can be die-cut, scored and folded to create a custom dynamic 3D shape. Marian can also laminate Formex™ materials with PSA for ease of placement.

Figure 2: Flame Barrier sheet

III. FRB SERIES PRODUCT

3M™ FRB Series Products are thin flexible insulation made of inorganic materials that are flame retardant (UL94 5VA) with high dielectric strength and excellent arc and track resistance. These materials are ultra-thin (<0.245 mm) and lightweight while remaining dimensionally stable. Marian has the capabilities to laminate 3M™ FRB materials with PSA.

IV. POLYMIDE FILMS

Polyimide Films (also known by the DuPont trade name Kapton are widely used in applicationswhere extreme heat and vibration are experienced. Polyimide films are flame resistant (UL94 V-0), maintaining their electrical, chemical and mechanical properties under extremely harsh conditions.

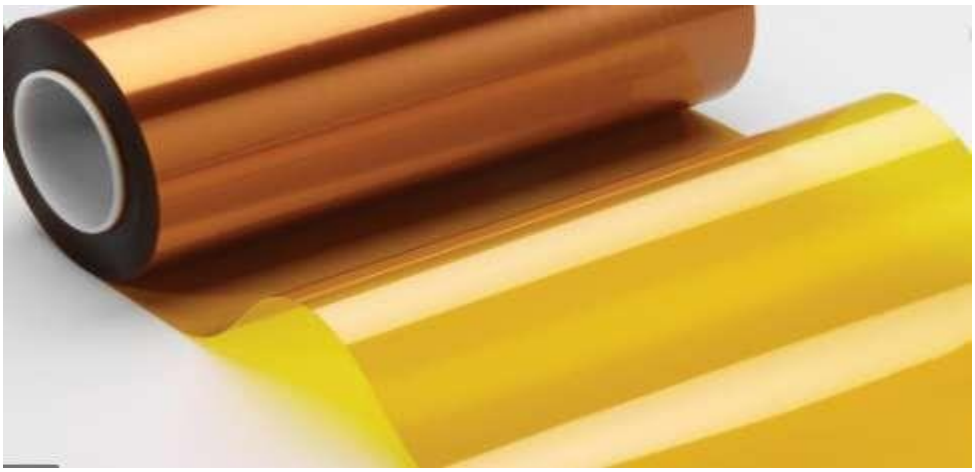

Figure 3: Kapton Polymide Film

V. CONCLUSION

After understanding the thermal, electrical and mechanical requirements of your application, your Marian sales engineer can recommend the most suitable materials. Material samples and prototypes can be provided quickly for testing.

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