Trends of Automotive Electronics and Material Needs

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Vehicles to realize low emission, safety driving and comfortable compartments are increasingly required. For environment, the market of hybrid vehicles is expanding contributing to reducing CO_2 emission and fuel consumption. Consequently, developments of high performance components for hybrid systems, such as batteries, motors and inverters have been accelerated. To materialize more safety vehicles, the future active safety system is being developed to reduce victims of car accidents in addition to the conventional passive safety system using seat belt and air bag system. The system includes sensing devices such as a camera or radar, electronically controll compornents such as electric power steering, brake and suspension. This is called the X-by-Wire system and required high reliability In addition, advanced car information systems including highly sophisticated navigation systems would be essential for more confortable compartments. Also, those are expected to enhance vehicle safety in coordination with the X-by-Wire system [1].

Systems for next generation vehicles are electrically-powered and electronically-controlled. The growing rate of the number of the electronic components is expected to be five times higher than that of produced vehicles in next five years [2]. Those components should be not only small, lightweight and low cost but also highly reliable. They could be mounted in engine compartments which temperatures exceed 125°C. The higher power density of the component due to smaller packaging are required technologies of high heat dissipation and heat resistance.

With these as backgrounds, we place expectations on materials, especially organic materials for automotive uses [3]. High temperature automotive electronics will possibly use some applications of advanced materials such as a high heat conductive thermosets [4] and a high heat resistant resin with silica-hybrid structure [5]. A low dielectric loss materials for a rader and high dielectric materials for high density packaging will be presented [6].

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