

(I) Function-Material-Application-Issue (No. 1)

Function	Materials	Expected Features	Application	Competing Materials	Technical Issues	Others
Insulation	Al ₂ O ₃ , SiC, BeO, AlN, MgO·SiO ₂ , 2MgO·SiO ₂	<ul style="list-style-type: none"> • Good thermal conductivity and corrosion resistance • Excellent mechanical strength • Contributing to make electric or electronic appliances small and to give them higher reliability 	IC board/package, SCR vessel, spark plug, high frequency insulation material, substrate for printer head	Plastic, enamel, glass	<ul style="list-style-type: none"> • Large scale, thin board • Small thin package • Removal of radiactive substances • Lower dielectricity • Higher thermal conductivity • Fitness with conductive material (Cu, Ag, Pt, etc.) 	<ul style="list-style-type: none"> • Effect of BeO powder on human body • Attachment to device saving gold
Dielectric	BaTiO ₃ , MgO·La ₂ O ₃ , SrTiO ₃ , Pb Perovskite	<ul style="list-style-type: none"> • Excellent thermal resistance and high frequency performance • Contributing to make capacitors small and high capacity and to give them higher reliability • Meeting demand for small high performance micro-wave filter 	Capacitor, dielectric resonator	Organic film, aluminum	<ul style="list-style-type: none"> • Small size, light weight • High reliability (high density sintered body fabrication) • Precise synthesis of complete crystal • Lower sintering temp. 	
Piezoelectric	PZT, PLZT, ZrO ₂ crystal, LiNbO ₃	<ul style="list-style-type: none"> • New applications for electromechanical products by the use of special functions • Developing new equipment using these products • Making small size and giving high performance 	Piezoelectric ignition device, piezoelectric ceramic transducer, ceramic filter		<ul style="list-style-type: none"> • High performance • New functions and applications to be developed by making thin film and single crystal • New applications by combination with other materials 	
Magnetic	Hard ferrite, soft ferrite, magnetic garnet, -Fe ₂ O ₃ , CrO ₂	<ul style="list-style-type: none"> • Making electronic devices small and giving them high performance 	Core, transformer core, storage device, magnetic head, magnetic tape, speaker, micro-motor	Sendust metal, amorphous metal, magnetic metal powder	<ul style="list-style-type: none"> • High performance of the material • Composite 	
Semi-conductive	BaTiO ₃ , SrTiO ₃ , ZrO, TiO ₂ , SnO ₂ , MgCr ₂ O ₄ -TiO ₂ , SiC	<ul style="list-style-type: none"> • New electronic products with new functions • Environmental control 	Thermistor, Varistor semiconductor capacitor, gas sensor	Zener diode, plastics, nylon, swelling resin	<ul style="list-style-type: none"> • Manufacturing of material control-lable of lattice failure • Making thin film, superfine grain and building layer • Multi-function • Composite 	
Ion conductive	ZrO ₂ , -Al ₂ O ₃	<ul style="list-style-type: none"> • Energy conservation by combustion control or power storage 	Oxygen sensor, solid electrolyte cell		<ul style="list-style-type: none"> • Improving for expansion of temperature range • Making small • New material 	
Electron Emmissive	LaB ₄	<ul style="list-style-type: none"> • High current density for electron beam source and tube • High reliability 	Anode for electron gun of electron microscope, Braun tube	Diode	<ul style="list-style-type: none"> • Higher current density • Longer life • Smaller beam diameter 	

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