Press Release

Nippon Chemi-Con Corporation
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Successful Development of Electrolyte Flame Retardant Technology
Application to High Voltage Aluminum Electrolytic Capacitors with Excellent Low Temperature Characteristics

Nippon Chemi-Con has succeeded in developing a new technology to make the electrolyte of aluminum electrolytic capacitors flame resistant by using a new flame retardant with greatly suppressed hydrolyzing properties. By applying this flame retardant technology, it has become possible to maximize the potential of high voltage aluminum electrolytic capacitors with excellent low temperature characteristics.

For aluminum electrolytic capacitors, since an organic solvent is used in the electrolyte inside the capacitor element, there is a fear that this electrolyte might catch fire if a short circuit occurs due to circuit failure, etc.

In order to prevent this, Nippon Chemi-Con has been researching the use of an electrolyte to which a flame retardant has been added. While there are various flame retardants available as shown in Table 1, after considering environmental safety and upon joint investigations with chemical manufactures, we succeeded in developing a new flame retardant with a structure that is resistant to hydrolysis.

The results of verifying the flame retarding properties of the aluminum electrolytic capacitors are shown in the photos below (Fig. 1 (a) and (b)). These photos show an aluminum electrolytic capacitor element after being exposed to gas burner flame for 10 seconds and the flame was removed. While the capacitor continues to burn even after the burner is taken away in the case of an ordinary aluminum electrolytic capacitor, the fire goes out immediately when the flame of the burner is taken away and the aluminum electrolytic capacitor element does not catch fire in the case of the aluminum electrolytic capacitor with the newly developed flame retardant. Thus we could confirm the fire retardant effect of the electrolyte containing the newly developed flame retardant.

In addition, when the hydrolyzing properties are compared with the commonly used phosphate ester based flame retardant, while the residual amount of flame retardant was 0% after 2,000 hours at 135°C in the case of the conventional flame retardant, it became clear that almost 100% of the newly developed flame retardant remained after a similar experiment.

Because of this flame retardant technology, it has become possible to use a solvent that was previously difficult to use in relatively flammable conditions, and to develop an electrolyte for a high voltage capacitor with excellent low temperature characteristics. Using this electrolyte we will be investigating products that can be used in very severe low temperature conditions, such as for example, in the power supplies or lighting inverter applications used inside a freezing warehouse, etc.

Table 1 Common Types of Flame Retardant

	Bromine + Antimony Trioxide Based Retardant	Hydrated Metal Compound Based Retardant	Phosphate Ester Based Retardant	Newly Developed Retardant
Flame Retardant Effect	◎	△	○	○
Water Resistance	○	○	×	○
Environmental Safety	×	○	○	○
Application to Electrolyte	×	×	○	○

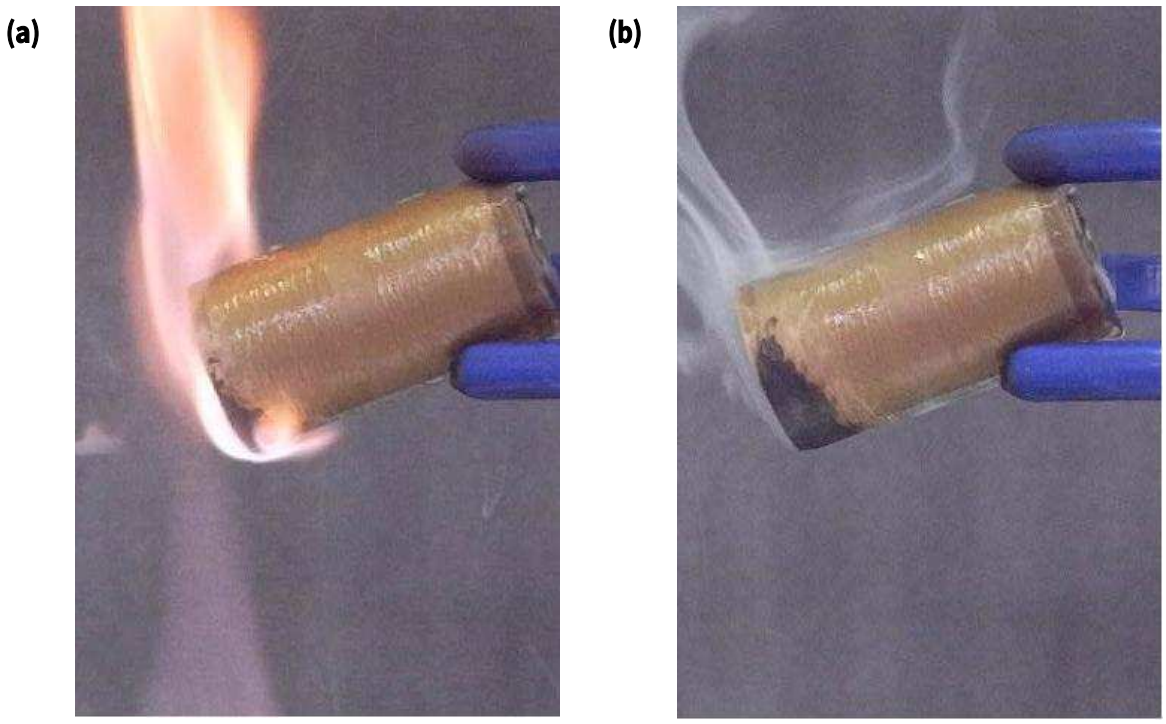

Fig. 1 Results of Flame Retardant Effect Test.

(a) Aluminum electrolytic capacitor element with electrolyte being exposed to gas burner flame.

(b) One second after the gas burner was taken away from the element.

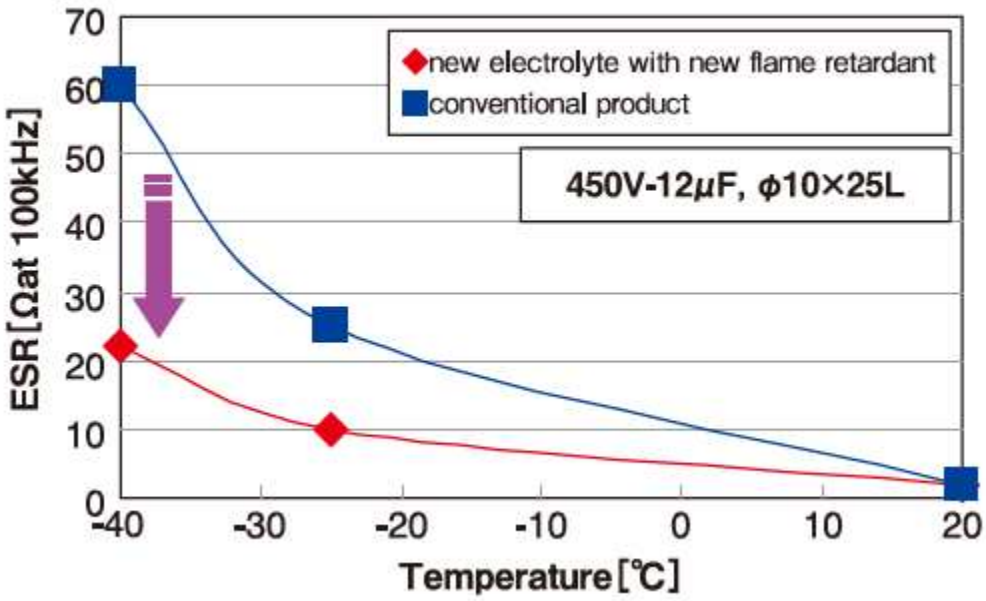

Fig. 2 Temperature Characteristics.
High voltage capacitor using new solvent with flame retardant has superior characteristic at low temperature.