

November 16, 2020

ADEKA Corporation

A scratch and cutting get back as before? A crosslinking agent giving self-healing characteristics to plastic is developed

ADEKA Corporation (President and Chief Executive Officer: Hidetaka Shirozume) has developed a crosslinking agent giving self-healing characteristics to plastic as a result of collaborative research with Professor Hideyuki Otsuka of Department of Chemical Science and Engineering, School of Materials and Chemical Technology, Tokyo Institute of Technology.

In addition, this result was received the Publicity Prize of 29th Polymer Materials Forum held by the Society of Polymer Science, Japan.


Polymers such as plastics is used in every scene of our living. Recently an eco-friendly technologies including the biodegradable plastic was developed because marine pollution with the disposable plastic garbage became the serious social problem. On the other hand, an approach to reduce environmental load by extending the life of plastics is demanded for infrastructure and a car, the house use.

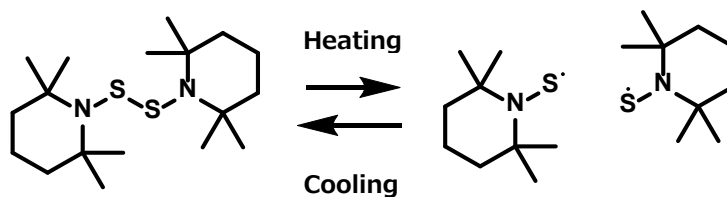
Developed crosslinking agent can give "self-healing characteristics" to plastic easily, and it is enables get back A scratch and cutting of plastics. It is thought that this self-repair characteristics become the key material of "the extension of life of plastic". For example, scratch on the plastic coating is disappear by heating of it. Furthermore, after cutting the plastic using our crosslinking agent in two, touches them in cut site and heating makes recombine them again.

These phenomena are caused by this mechanism that "Dynamic covalent bond *1" in the "BiTEMPs structure *2" dissociate / combine by heating and broken molecule became restored. As described, our crosslinking agent can give self-healing characteristics to plastic easily.

We will push forward the development and application search of this crosslinking agent for life extension of plastic to contribute the sustainable society.

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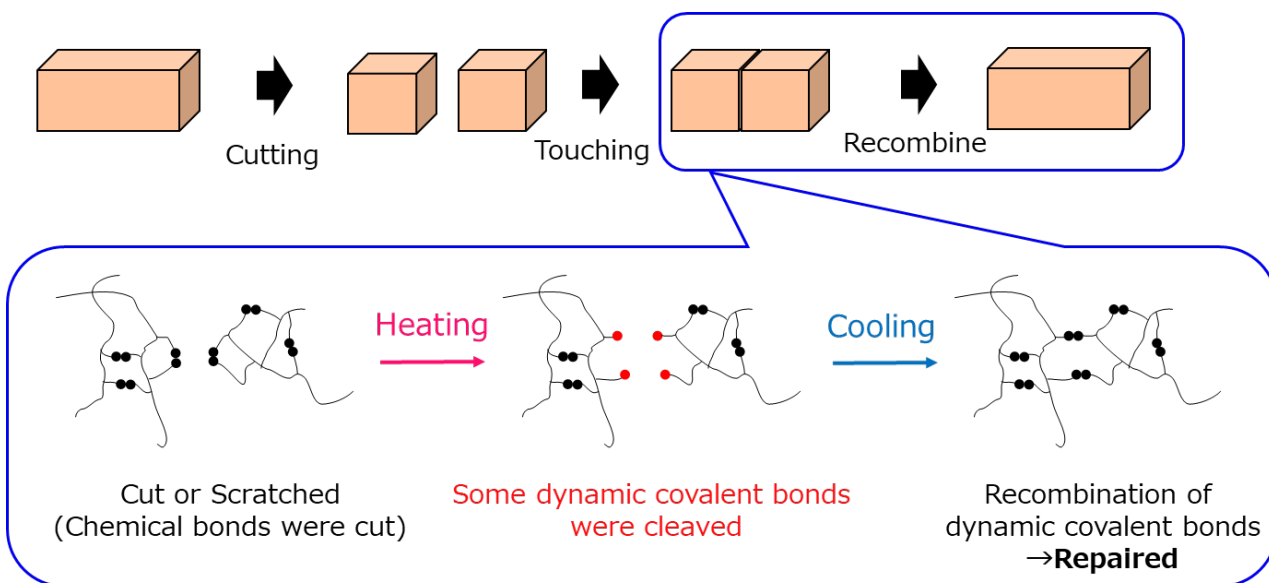


▲ **Dynamic covalent bond by BiTEMPS structure**

*1 **Dynamic covalent bond:** A covalent bond which can recombine by specific outside stimulation.

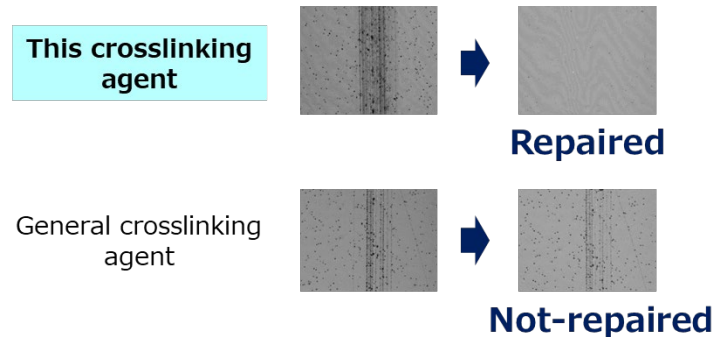
*2 **BiTEMPS structure:** Backbone of the developed crosslinking agent.
This backbone can dissociate or combine by heating or cooling.

Supplement 1: Self-healing mechanism of “A crosslinking agent giving self-healing characteristics to plastic”



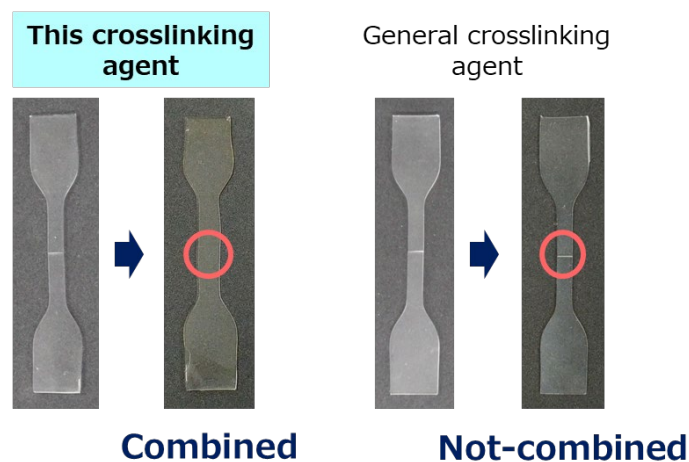
Supplement 2: Self-healing effect using this crosslinking agent of plastic

➤ **Scratch repairing**



※ A comparison after heating at 120°C for 24hours. Glass was coated with plastic containing 10% of crosslinking agents and was scratched by pencil.

➤ **Recombination of cutting**



※ A comparison after heating at 120°C for 24hours. A plastic containing 10% of crosslinking agents and was cut by knife.

■ **Contacts**

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