

Messages from Modern Inventors to the Next Generation

Season 2

2. Bright Red Maple Leaves are the Roots of FriXion Ball

- Mr. Norikazu Nakasuji, Managing Director, PILOT Corporation,
President and Representative Director, THE PILOT INK COMPANY, LIMITED



Don't most of us think how easy it would be if we could erase mistakes written with a pen in the same way as a pencil every time we use correction tape on a mistake we made? FriXion Ball came into being to eliminate such inconvenience.

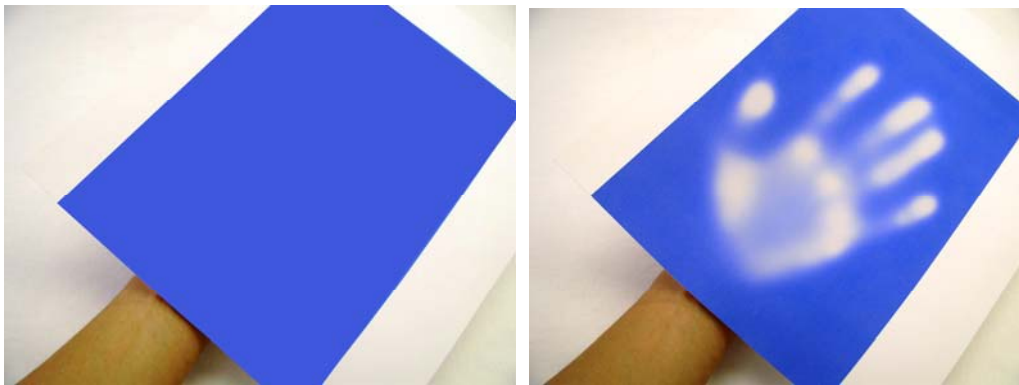
Actually, a familiar natural phenomenon inspired the development of the technology of using frictional heat to erase writing which is applied to FriXion Ball.

Introduction of the product/technology

Material that changes its color according to temperature change is called Thermochromic material. The new material we developed was designed in a way to give us complete control of its color transitions and color change temperatures and was named "Metamocolor" from the Latin word "metamorphosis" meaning "to change." In 2005, when more than thirty years had passed since we first developed Metamocolor, we set the discoloration temperature of Metamocolor so that it produced color at minus 20 degrees C and made color disappear at 65 degrees C and applied the material to a writing instrument; that is FriXion Ball. When you rub a letter written with FriXion Ball using the rubber eraser on the pen, the letter becomes transparent by the frictional heat. It is possible to write and erase the letter over and over again without any eraser debris. "FriXion Ball," an erasable and colorful ballpoint pen, is an innovative and advanced writing instrument that is also useful.

What inspired you to invent or develop the product/technology?

The changing color of nature during the four seasons in Japan is wonderful. The way dark green maple leaves change their color to bright red in late autumn is nature's magic. More than thirty years ago, I was greatly impressed to see a mountain covered with maple trees turn flaming red and thought "I want to create such brilliant color transition inside a test tube." This idea was the starting point for the development of Metamocolor. Though I do not remember how many times we conducted trial-and-error experiments, I cannot forget the excitement I felt upon seeing five fingers appear sharply on the paper coated with the composition of materials presumed as being "the most likely compound to change color with body heat" after discovering a composition that changes color from a hair dryer's heat and changes color when placed in a refrigerator. At that instant, I perceived the new principle in its entirety. In the course of developing many commercial products, we were asked from abroad if we could make a ballpoint pen that easily erases like pencils. This inquiry triggered the development of "FriXion Ball".



Showing how Metamocolor changes color when exposed to the heat generated from a hand

What specific ideas and difficulties have you faced in inventing or developing the product?

Although we discovered a new principle, we weren't sure how to apply the principle. At that time, a writing instrument was considered good when its writing did not change color so the products we thought of were all very different from traditional writing instruments, which is our main business. These included drinking glasses and bathtub toys that changed color in amusing ways, the ideal temperature indicator for beer, etc.

In 1989, about 15 years after the discovery of the new principle, we received a proposal from the world largest US toy company that "they wanted to launch a 'makeup doll' that little girls love." The lipstick and eye shadow are applied using cold water, and the makeup is taken off with warm water. Girls can safely play with the doll over and over again. We created a "new Metamocolor"

that can retain color on a doll's face with makeup or a face without any makeup at room temperature.

In 2004, about 30 years after the discovery, there was an inquiry from a European sales company asking for a solution to the problem of erasing mistakes made with pens since students in primary and middle schools use ballpoint pens. At that time, the technology of "new Metamocolor" was advanced to the stage where it produced color at minus 20 degrees C and made color disappear at 65 degrees C and was able to maintain the colored state and colorless state even in high summer and midwinter. The 65 degrees C is the temperature that ink disappears with frictional heat of a rubber. The remaining issue was to transform Metamocolor into tiny particles because ink has to flow through the narrow gap at the tip of a ballpoint pen. In this way, FriXion Ball came into being. At long last, technological development and market demand coincided, and we were able to apply the material to writing instruments, which is our main business. The writing instrument was named FriXion, derived from the English word, friction. With the creation of FriXion, the writing instrument evolved from an instrument for just keeping records to an "instrument for thinking" with which one can write, erase, and write again.

What gives you joy as an inventor/researcher/developer?
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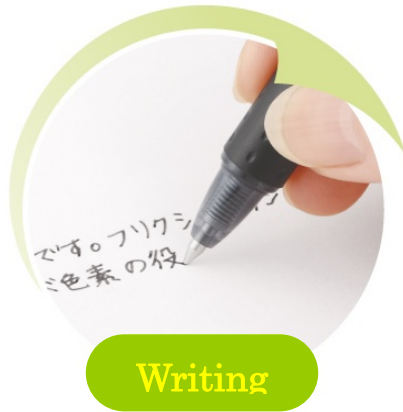
I developed Metamocolor by taking nature as a model and having a dialogue with nature. It is said that painters can see light ordinary people cannot see or that musicians can hear sound ordinary people cannot hear. Children are able to see a creature such as "My Neighbor Totoro" that can only be seen at a certain moment. Once in a while, nature lets us glimpse "the truth" but not all of us can see this truth. It seems that only those who are searching for the truth in a sincere attitude at all times, unhampered by conventions, can capture that moment. For this purpose, the important thing is the feeling of being impressed by things. Things such as pretty flowers, a beautiful sunset, twinkling stars at night... the strong impression of seeing for the first time the small rings of Saturn, which resembled straw hats, using a small telescope in the old days....

Time seems to move slowly when one is a child, but as one gets older time seems to pass faster. Some people say that this is because people are less and less impressed by things as they grow up. I want you to use your sixth sense in addition to the five senses and have a dialogue with nature. This dialogue might possibly lead to "a world first discovery." The important thing is the feeling of getting excited.

For more than 30 years, I have been involved in this project, from the conceptualization of Metamocolor to the commercialization of FriXion Ball. During those years I have felt the greatest happiness as a technical expert and a manager, being able to work with many colleagues who share

the same enthusiasm.

There seems to be an infinite time for all of you. Eventually you will discover an “ability” you were not aware of. Please try not to miss taking advantage of that opportunity.



“Writing” and “erasing” letters using FriXion Ball