Basic of Silver surface reflection

≪The secret of the unique shine of silver≫

Humankind began to use silver around 3000 BC, and until today's modern society, the unique brightness of silver still attracts many people.

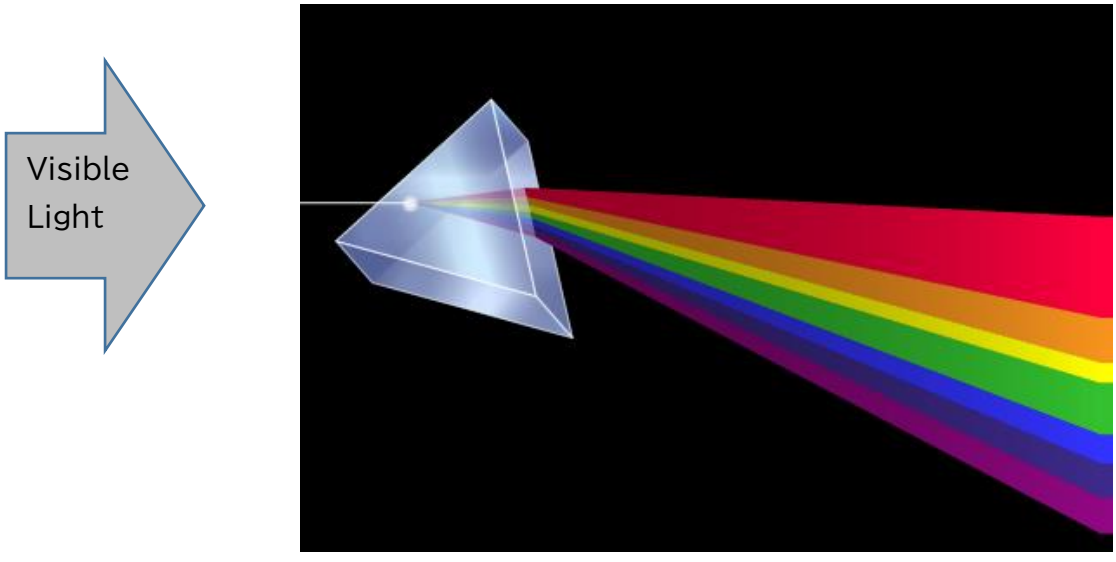
Today, there are differences in value compared to gold due to differences in production, but silver has a strong popularity as an industrial product, accessory, and jewelry using silver. One of the charms of silver is its unique brightness. Silver has been recognized by everyone as valuable because it possesses this unique brilliance and can be used for coins or used for Olympic medals etc. Perhaps it is an ancient influence that respected the shining sun, and since then humanity has come to be attracted and interested in everything that has this shine.

What mechanism causes this unique silver brilliance to occur? Before that story, we would like to reaffirm the basic theory of color.

Every day, the objects and landscapes we see are colored by the sun's rays, and we can recognize them. The sunlight contains various electromagnetic waves such as visible rays that humans can see and infrared rays, ultraviolet rays, X-rays, microwaves and radio waves that cannot be seen.

What humans can see is a wave in the range of 360nm to 830nm, which is called visible light. As it approaches 800nm, the wavelength becomes longer and looks red. In addition, the wavelength becomes shorter and becomes purple when approaching 400nm. If the wavelengths in this range are combined into one, the color will be white. In other words, visible light is not colored. We usually call this visible light "sunlight".

This visible light can be observed as a colored light by passing through the prism.



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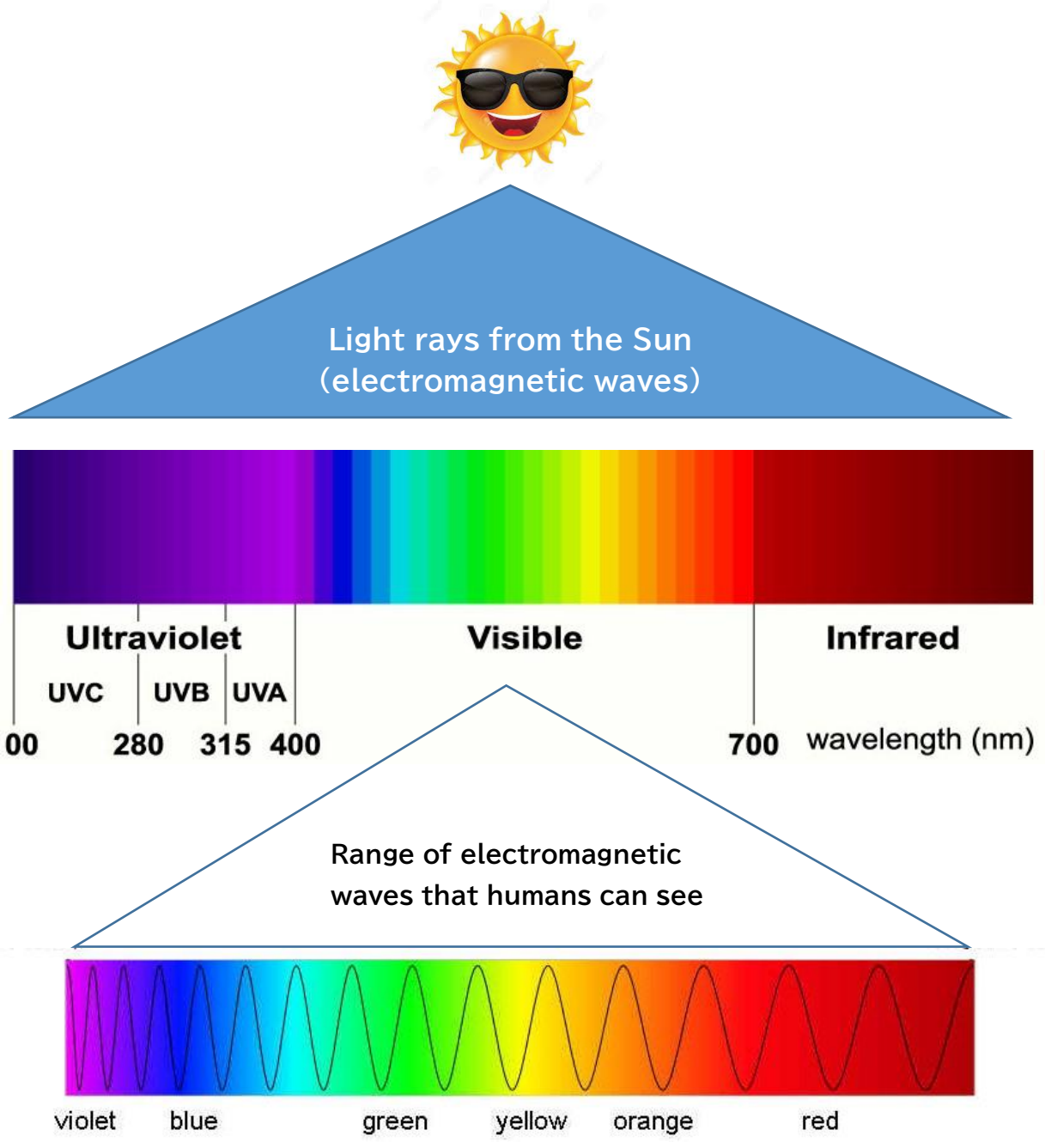

We recognize the color by visually observing the light that is in the visible light range (white light) and partially absorbed or partially reflected by the object.
As an example, ruby looks red because the visible light that hits the ruby body absorbs light of wavelengths other than red, and the remaining red wavelength light enters the eye, so the ruby looks red. In other words, the color of the object we are seeing is caused by the visible light that hits the object being selectively absorbed by the surface of the object, partly reflected, and partly absorbed. We recognize color by the reflected rays.

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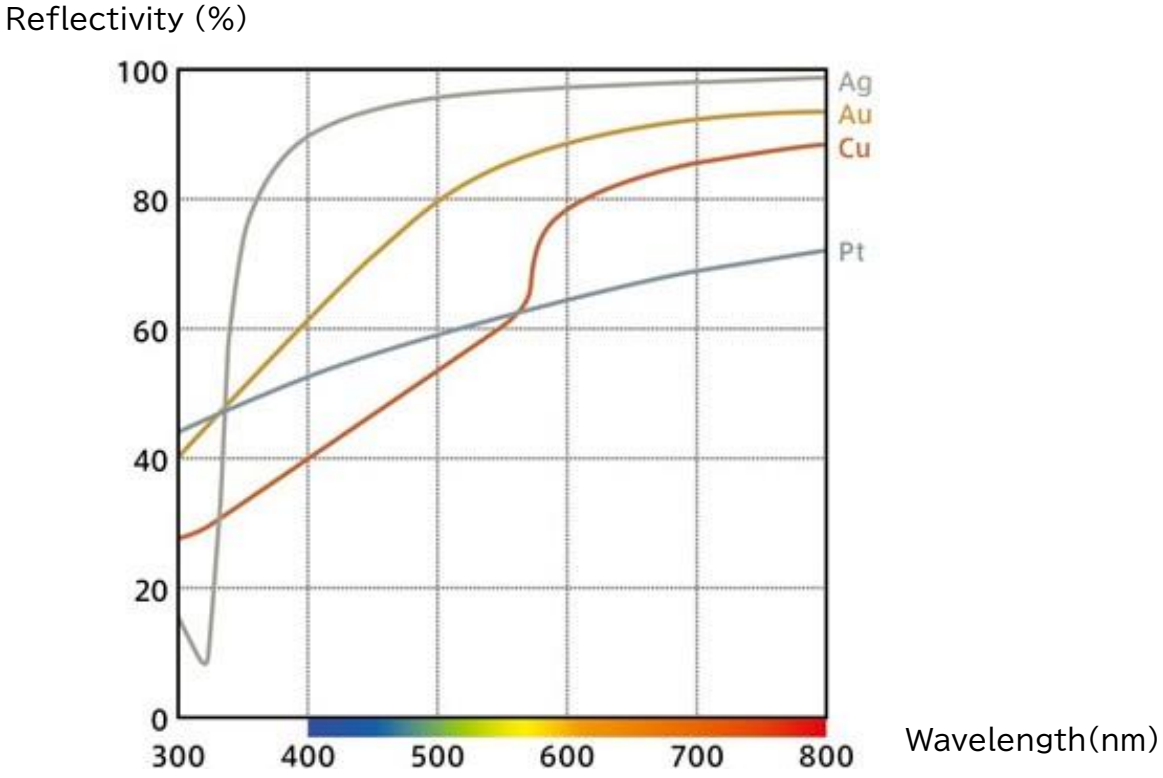
So what about silver?　Silver is the most highly reflective metal of all things on the ground.　Silver reflects about 98% of visible light on average. By the way, gold reflects about 90% and copper reflects about 60%.
From the figure below, silver has a high reflectivity from 400 nm before the start of visible light, and when it exceeds 400 nm, it reflects about 90% of the wavelength.

In the case of gold, the reflectance increases when it exceeds 500 nm (exactly 560 nm), but part of the wavelength up to that point is absorbed, and as a result it appears golden. Similarly, copper has a reflectance of 80% or less until it exceeds 600 nm, and the portion of wavelengths shorter than 600 nm is absorbed, so the remaining orange and red wavelengths are reflected, and the color of the copper surface becomes a reddish color.

This is the explanation of why silver emits its own sparkle. The secret was the highest reflectivity on the ground. The silver brilliance that you are seeing means that you see almost all of the visible light coming from the sun. I feel that every time I look at the firing PMC, I can understand that the ancient people thought the shine of the sun was God's thing.



Reflectivity and visible light wavelength of each metal