Superluminova

Since timepieces have been in existence the question of telling the time in the dark has constantly occupied watchmakers. For a long time solutions were limited to repeater mechanisms, candles or an open dial which allowed the hands to be touched with the fingers.

With the onset of the First World War the urgency of solving this problem became paramount. Watchmakers of the time remembered the great discovery made at the end of the 19th century: radioactivity, whereby the luminescence of radium was an important aspect. And it was this characteristic that was used in the watchmaking industry for many years, but later abandoned in favour of tritium owing to the high level of radioactivity in radium.

Used until the 1990s, tritium also proved to be radioactive, but at a much lower level than radium. Tritium was then replaced by superluminova, a material that has the same properties as tritium, but is not radioactive and thus more environmentally friendly.

There is a fundamental difference between superluminova and tritium-based luminescent substances. The latter are permanently stimulated by electrons (betarays) that tritium emits when it spontaneously transforms into helium. It is for this reason that it remains luminescent for several tens of years, even in total darkness.

In contrast, superluminova needs to be stimulated by violet or ultraviolet light. After being “charged” in this way it emits a more intense luminescence than tritium which gradually fades after a few hours in darkness, however.

The principle of luminescence

Luminescence is produced when the electrons in a molecule or a crystal are stimulated by an external energy source. This can be ultraviolet light (“black light”), a biochemical reaction (as in the glow-worm) or radioactivity, but not heat. The electrons thus stimulated normally return to their original state very quickly by emitting radiation, sometimes in the form of visible light. In the case of superluminova, the energy emitted by the electrons is stored at a relatively stable level, which results in light being emitted over a period of several hours.