

Mark Miodownik

Split personality



Uranium is toxic, pyrophoric, radioactive, and has become the totem of our nuclear age. The element is associated with energy, bombs, disaster, dread, and it is a touchy topic for scientists, who view the element like a crazy uncle who never knows how to behave himself. This was not always the case, the hopes were high for the element in the early 19th century, not least because of its marvelous aesthetic properties.

In the 1850s, glass makers in Bohemia noticed that adding small amounts of a uranium ore (pitchblende) produced a new type of colored glass. This green-yellow glass was odd, its color was not just a novel hue, but it also had a weird shimmer that distinguished it from the traditional green glasses produced using iron ores. It was different, modern, and, in the late evening sun, almost seemed to glow. The glassware became very fashionable. No one at the time had the faintest idea that this weird green glow owed its nature to the phenomenon of fluorescence. Or that it was the element uranium that was doing the fluorescing. That came later when Henri Becquerel and Marie Curie identified the cause, and added radioactivity to uranium's talents.

Such was the early optimism surrounding radioactivity that face creams, toothpaste, and even hearing aids were developed, all claiming to be more effective than their nonradioactive competitors. Uranium glass then became not just a beautiful type of glassware, but also potentially medicinal. Claims were made that fruit juice served in a uranium glass jug might be a tonic, or that food might be protected from bacteria in uranium glass dishes.



Fluorescence picture of a uranium glass fruit bowl. (Courtesy of Jake Baum and a residency at Monash University, School of Physics and Materials Engineering.)

You can still find relics of this optimistic era on the mantelpieces of that generation or in the forgotten cabinets of antique shops. One way to spot uranium glass is to use a Geiger counter, however the shrill increase in clicking as you locate uranium glass tends to cause panic and annoy elderly relatives. A less ostentatious show of scientific savvy is to shine an ultraviolet light onto any green fruit bowl you might happen to spot. If any of them are made of uranium glass they will light up, suddenly casting off their dusty appearance and fluorescing like the Holy Grail! The effect is so startling in a dark room that the first time you see it, you might swear that it was accompanied by the singing of angels.

Uranium was also used to improve the appearance of dentures. Teeth are fluorescent, and glow a ghoulish green color in ultraviolet light. In nightclubs, where ultraviolet lights are common, this has the unusual effect of making people who smile look like hungry zombies. In natural daylight the reverse is true, and dentures that match the color but not the fluorescence of natural teeth look dead and slightly odd. The social embarrassment caused by this can be acute, and materials scientists in the early 20th century were keen to help. The answer was simple, just add a touch of uranium to the dental ceramic. Of course, it also meant that patients' teeth became radioactive, sparking a debate about health risks of a radioactive mouth versus the superior aesthetics of a fluorescent smile. In the early half of the 20th century, aesthetics won, with many people receiving radioactive teeth. But after Hiroshima, some dental surgeons developed unrealistic fears that their patients might bite too hard and explode. In any case, the detrimental effects of radiation became known and the practice was banned.

These episodes marked the end of the aesthetic and therapeutic applications of uranium, and the official withdrawal of the element from the public realm and into reactors, bombs, and bullets. Sadly, the shadows of its previous bohemian life exist only in the cupboards of an ancient relative and in their radiant smiles.

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