

## From the Color of Dollars to the Color of Diamonds: Kurt Nassau Serves as Materials Consultant

From the color of dollars to the color of diamonds, Kurt Nassau has served as a consultant on a number of fascinating projects—a career that began while he was working as a researcher for Bell Laboratories.

Nassau arrived in the United States from England in 1948 and spent three years in medical research at the Walter Reed Army Medical Center. It was then he decided to go back to graduate school and in 1959 earned his PhD degree in physical chemistry from the University of Pittsburgh. While working on his thesis, he had an offer to work for Bell Labs. Nassau spent 30 very productive and successful years with Bell, working primarily with laser materials and crystal growth projects. His first project involved calcium tungstate (scheelite), where he grew the first Nd-containing laser crystal. Nassau said that when he discovered that the materials he grew in the laboratory also occurred in nature, he next studied minerals and gems on his own. This led to his interest in the mechanisms that produced color in these materials, and his hobbies of color and gems were born.

So how did he become a consultant? He had no choice in the matter.

Nassau returned from lunch one afternoon to his laboratory at Bell when his assistant said, "The chief attorney at the IRS wants to speak with you." As Nassau recalled, "That's a very disturbing thing." But it turned out that they did not want Nassau for any personal tax indiscretion. They needed his help evaluating a suspicious donation to the Smithsonian Institute. When Nassau questioned management at Bell Labs about working as a consultant, the response was, "Anything the IRS wants, do it."

The donation was a chunk of colorless Brazilian topaz, worth about \$1000. The donor claimed that if it were irradiated, and if it turned a brilliant color as a result, and if the color was stable, and if it did not break in the process, it would be worth \$1,000,000, which he had deducted from his income tax. The question for Nassau was whether the gift was worth the high appraisal the donor had placed on it. The case went to



Kurt Nassau

Supreme Tax Court where Nassau testified as a consultant, naming the donation "mediocre." It became known as the "Dubin Case" (Dubin vs IRS) and is still cited in court cases involving donations.



Kurt Nassau grows crystals at Bell Laboratories in the 1960s.

In fact, it changed the donation laws.

Another of Nassau's cases involving the government concerned counterfeiting. The National Academy of Sciences asked Nassau to serve on a panel for the Bureau of Engraving and Printing. The area Nassau was to address was the issue of color. He recommended the Mint make bills more difficult to counterfeit by using colored inks. The work was somewhat counter-productive as the panel's recommendations were printed and disclosed publicly. As Nassau put it, "Any forger could buy them for \$20." But on a more positive note, he said that his participation did have personal benefits, "We had talks from the FBI, from the CIA, from Interpol, and saw the Printing Office all the way from top to bottom."

Several of Nassau's consulting cases involved priceless—and worthless—gemstones.

A Chinese merchant from Singapore had sold about a million dollars worth of blue gems. The buyer then questioned their authenticity. These particular stones could have been irradiated, and might fade when exposed to sunlight. Unfortunately, all of Nassau's research did not affect the final verdict. A legal technicality involving the contract for the sale of the gems did.

One of Nassau's more humorous cases involving gems occurred when the Gemological Institute of America asked Nassau to resolve some slight problems they faced with a particular ruby. When the tests were complete and it was time to return the ruby, he asked for what amount he should insure it. The response was, "Well, if you think it's natural, insure it for \$10,000; if you think it's man-made, just stick it in an envelope and send it back." The ruby went back in an envelope.

When purple tanzanite was discovered, there was a question about whether it was natural or synthetic. Until that time, the mineral had only ever been known in green. The Gemological Institute turned to Nassau to make the determination. Because of its shape and appearance, he was able to declare that purple tanzanite was indeed natural, not grown in a laboratory.

With his technical knowledge of crystal growth and gemstones,

Nassau had been asked numerous times to join in gem manufacturing activities, which he declined until the day someone approached him with moissanite in hand—colorless.

Nassau said, "It's sort of interesting how they came to me. Moissanite [a silicon carbide crystal] was first discovered in the Canyon Diablo meteorite from Arizona by a French professor (and Nobel laureate), Ferdinand Frederick Henri Moissan. Almost immediately, manufacturers started using this material under the name carborundum as an abrasive. Until the 1990s, for about 90 years, researchers tried but were unable to grow it in a controlled fashion or to control the color. It was always green, yellow, blue, or black. In a book back in 1980 on growing synthetic crystals, I had written that moissanite—if one could ever grow it colorless and grow it in a controlled fashion—would make a magnificent diamond imitation. It is second only to diamond in hardness. Its optical properties are a little bit better and in a sense it's tougher because diamond has a cleavage plane which silicon carbide does not. So when they showed me this colorless material, I immediately said, 'Yes, I would consult.'"

Nassau is so well-known for his work in gemology that he has served on the Board of Directors for the Gemological Institute of America for 20 years.

Perhaps Nassau's most unusual case involved a car part. René Lalique, the famous French glass artist, created radiator ornaments used in early automobiles. The glass design consisted of a woman with long flowing hair, for example. Each had a lamp underneath. The faster the car

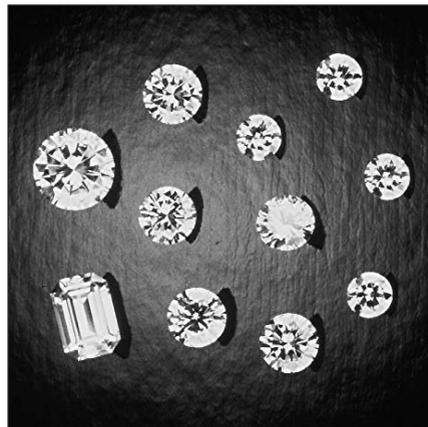
*Several of Nassau's consulting cases involved priceless—and worthless—gemstones.*

would go, the brighter the lamp would shine. Today, these collectibles sell in the range of \$60,000. A European car manufacturer bought four of these ornaments. All had been irradiated to color them purple. Had they been irradiated by Lalique, they would be worth the \$250,000 each which he had paid. The question was,



Kurt Nassau, at Bell Labs, conducting an irradiation experiment in a Cobalt-60 gamma cell.

were these radiator ornaments irradiated by Lalique—or later on? According to Nassau, "It was a very complicated case because the question came: When did



An array of colorless moissanite gems, which serves as imitation diamonds.

irradiation start? When were the x-ray tubes first available? All kinds of complexes like this." Unfortunately, the car manufacturer had been swindled. It was proved that the seller had someone irradiate the ornaments.

In addition to requiring a vast range of knowledge, consulting presents other challenges. Nassau said, "Very often the difficulty is that the company one is consulting for doesn't really want to tell you what they're doing because they feel they have such a secret process." Also, consulting requires being something of a detective because a company will ask questions regarding something peripheral to their specific product. Quite often their questions have to do with results they have already gotten.

"I once had a company where all they would tell me was that it had something to do with color," Nassau said. "They kept on asking questions like, 'How would you produce certain colors in a plastic?' I made a number of possible suggestions and one of those suggestions they picked up on and said, 'Well, how would you get a good color?' Just based on my knowledge of the different causes of color, I said, 'Well, it's interesting now you come to mention it because I think that if you raised the concentration you would go from a very weak,

washed-out milky color to achieve a clear, intense color, but as the concentration went up it would go to an almost black color.' You could hear a sigh of relief from almost everybody, and they said, 'Goodbye.' They had apparently observed this, but, because there were several interacting color mechanisms, they could not explain it and wondered if they were doing something wrong. And so without knowing what their problem was, I explained the mechanism that would produce this kind of a change, which is the information they were after."

Nassau said that getting started as a consultant is not easy. It requires more than being an expert in a field. Visibility is the key. He said, "But if you're not well-known, are not prominent in some way, then the difficulty is how do you let them know?"

Nassau claims he does not know how to do this. But it is obvious from his seven books, 17 patents, hundreds of papers, and numerous court cases, that he does. □