An unspeakable love of gold

There are some moments when you need to keep quiet. What you've got to say may be relevant, perhaps even interesting, but there are times when your materials science geek needs to take a back seat to the occasion. For instance, your own wedding, when you are about to exchange rings with your prospective husband or wife, is not the time to muse on the significance of gold. In fact it is not the time for rational thought at all.

Nevertheless, sometimes these thoughts creep into a mind trained to question everything. The main thing is to resist articulating them. You definitely should not think about the fact that the quantity of gold available to humans has remained almost unchanged for hundreds of years. Increasing marginally through mining, and decreasing through being sent off into the solar system as part of spacecraft. If gathered together, all the gold in the world would fit inside a large town house. This makes gold extremely rare, and so extremely valuable.

But it's not just the rarity that determines price, gold has a very high reduction potential and so is one of the most chemically inert metals in the universe. The phrase, "This is going to be the acid test of the relationship," commonly muttered by more cynical members of wedding parties, has its etymological route in the test for gold. The acid in question is nitric acid, to which true gold is impervious.

In fact, gold resists the attack of almost everything. When a salvage company called Odyssey Marine Exploration recently found a wreck thought to be that of the Merchant Royal, a ship that sunk in a storm off the coast of England in 1641, anyone with an interest in materials knew for certain that whatever had happened to the cargo of the wreck, there would still be gold down there. Sure enough millions of dollars of gold doubloons were recovered in mint condition, gleaming brightly despite having been at the bottom of the Atlantic Ocean for more than 300 years. Similarly, the wedding ring you are about to give as an expression of your everlasting love will still be gleaming brightly in the grave of your loved one, thousands of years after you are both dead. Of course, it goes without saying that you shouldn't mention this at the wedding.

These days nanoparticles are the cutting edge for gold. Being extremely stable, inert, and useful reagents, they are fast becoming the workhorses of the Nano world. They are being used to investigate cancers, trap toxins, and build all manner of nanostructures. Of course, the ability to control tiny gold particles is nothing new, creating colloidal suspensions of gold was one of the ancient ways to colour glass red. However, during your wedding ceremony, resist the urge to point to the red-stained glass windows, and whisper in your beloved's ear, "You see dear, nanotechnology is just a new word for an ancient technology."

For much of history, gold was thought of as a material manifestation of perfection. In particular, the alchemists believed that metals contained different ratios of the elemental substances mercury and sulphur. In certain combinations, these substances produced metals such as lead and iron, but in the perfect combination they produced gold. Hence the idea that in the right circumstances, lead might be turned into gold if the ratios were corrected.

Modern science has been less kind to gold's position as King of Materials. The periodic table, that league table of chemistry, holds no special position for gold. It is mid-table, apparently nothing special. Nor does nuclear physics do it any favours. Its nucleus is not the most stable in the universe. That honour goes to iron. In spite of this fact, producing an iron ring for your prospective husband or wife at the wedding ceremony should not be considered under any circumstances.

Gold is the most malleable metal on the planet. It can be hammered into a paper so thin that it becomes transparent, appearing blue/green as a result of strong reflection of red and yellow. At a slightly thicker gauge, it becomes gold leaf. A single ounce of gold can be beaten into golf leaf with the fragility and beauty of a butterfly wing but covering 300 square feet. If your marriage doesn't work out, it is possible to beat your wedding ring into gold leaf to cover the whole exterior of a sports car.

Not that losing out in love will necessarily turn you into a modern Goldfinger, someone who drives around in a golden sports car and "loves only gold", as the classic Shirley Bassey song goes. However, it's still best not to mention this possibility at the wedding. As they say, silence is golden.