View this email in your browser

Message from the President

Spring is on its way, and we can start thinking about field trips. If anyone has ideas about trips that we can take, please send me an email

New Grant Fund Awarded to Club

Jama Crawford recently submitted a grant request to the City of Durango Lodgers Tax Fund and it was awarded. The Gem Club is deeply grateful to receive a $16,508 grant that will primarily serve two purposes.

First, the funds will purchase professional grade pneumatic equipment for metal engraving and advanced stone setting (bead setting and pavé). This new equipment allows the Club to offer more advanced techniques during classes and Open Shop, and helps our members produce higher-end jewelry items. The system will be purchased and installed by early summer: training will be required to ensure proper use.

Second, the grant provides scholarships to approximately 28 students this year for Weekend and Gem Show classes. Scholarships will cover 60% of the tuition cost; students will pay the 40% balance. For example, if a class costs $150, the grant will pay $90 and the student will pay $60. This program will launch on April 1, with an online scholarship application form. Watch for scholarship details on our website and on Facebook by the end of this month. Scoring criteria shall include a) persons with a financial need, b) residents of the Four Corners Region, and c) workers in the hospitality and tourism sector in La Plata County. However, any person age 15 or older may apply.

Thanks Jama!

2023 Gem and Mineral Show!

Cindy Pugsley and Adam Parker are organizing the 2023 Gem Show. The next schedule meeting for the Gem and Mineral Show is Wednesday, March 15, 2023 from 6:00 to 7:30 pm at the Clubhouse. If you can contribute to the process, then please contact Cindy at cindypugsley@sbcglobal.net. Also, we are accepting donations for the Silent Auction.

Safety Reminders - Solder Station Training

Training for the solder station will be offered by Jama Crawford on March 14 from 12:00 pm to 1:00 pm and 6:00 to 7:00 pm. If you want to use the torch at the solder station you can take this in-person lesson or watch a 12-minute training video at SolderStationTraining - YouTube. There is a review exam after the training that is available in the Shop.

Upcoming Classes in March

Adam Parker and Chayse Romero have classes being offered in March. You can check on upcoming events at the Four Corners Gem and Mineral Club Events Calendar - Four Corners Gem & Mineral Club (durangorocks.org)

Open Shop Hours

Tuesday 1-4 pm

Tuesday 6:30-9 pm

Wednesday 9am-noon

Wednesday 1-4 pm

Thursday 1-4 pm

Thursday 6:30-9 pm

First & Third Saturdays 10am-2pm

Thursday, January 5, 7-9 pm: Open Shop Casting Day

Open Shop Punch Card

If you like using open shop, remember we have a punch card for multiple use. Prepurchase 10 visits for $45 - a $5 savings - and don't worry about having your "shop fee" when you come in!

Rock On: “Not All that Glitters is Gold!”

The creation of most minerals colors is relatively easily to understand. Wavelengths of energy from a light source such as sunlight interact with the mineral and its atomic structure. If a mineral absorbs certain ROYBGV spectra, then the mixture that comes to our eyes is the color we perceive. For example, a red mineral absorbs most wavelengths except the red end of the spectrum and white mineral absorb most of the wavelengths. But what about minerals that are opaque with metallic lusters and colors that are gray, golden, silver, and bronzy. These colors are distinctive of minerals that are sulfides, sulfosalts, oxides, and native elements. How are their colors created and why are they so different than the typical range of colors?

Let us start with a more common phenomenon that can help explain the process. When sunlight strikes many objects on the surface of the radiant energy is absorbed. Some of the energy is then released but not in the same state, but as thermal energy that gets trapped by the atmosphere, the Greenhouse effect. But how does this apply to minerals with metallic lusters and colors?

Atoms of elements contain a core of protons and neutrons surrounded by a cloud of negatively charged electrons. Every electron occupies a certain position outside the core of the atom and each of these positions have different energy levels. The outermost electrons (valence) are those that make mineral magic. It is these electrons that allow atoms to combine in a process called bonding. Bonding happens so that the outer electron fields can be filled and stable which in turn make stable solid compound that we call minerals. The valence electrons of a given atom can combine in several different ways to bring the atoms together.

Before an atom is bound to other atoms the valence electrons are in certain positions. The distribution of valence electrons are held in a zone called the valence band. Higher energy levels in the atomic structure are unfilled but under certain conditions the valence can move into these higher levels called the conduction band. The valence band and a conduction band are separated often separated by a band gap. The band gap is the energy (e.g., light energy or photons) required to promote a valence electron bound to an atom to the conduction band level where it is free to move within the crystal lattice to allow bonds to form and serve as a charge carrier to conduct electric current. In many minerals the size of the band gap influences the absorption of wavelengths of light energy that create colors.

Let’s consider minerals dominated by metallic bonds such as gold, copper or platinum. Because atoms in these minerals tend to have only a few valence electrons then something unique needs to happen for the atoms to bond. The outer (valence) electrons in metallic bonds can roam and are thus able to migrate to form a cloud of electrons shared “cloud” by all the atoms. In metallic-bonded minerals the valence and conduction bands overlap with no gap between them. This allows the entire visible spectrum of light to be absorbed and the mineral appears opaque. This process also created distinctive electrical and thermal conductivity.

Some of the energy absorbed by in minerals with metallic bonding is released after absorption (radiated) creating distinct reflective luster and metallic colors. The photons are absorbed by electrons near the top of the energy band and energy is released as the electrons fall back into lower energy levels from the conduction band. Native silver absorbs and re-emits the entire visible spectrum which gives it a high luster and light gray color. In gold, the longer wavelengths of light (red, yellow) are absorbed more whereas the blue and violent end of the spectrum are absorbed less and can penetrate the atomic structure to a greater depth. The blue and green wavelengths emit less visible light but creates a faint blue-green color on the beautiful reflective yellowish-red color of gold.

On the other extreme end of the band gap theory are those minerals whose gap between the valence and conduction bands is greater than all wavelengths of light energy. So, none are absorbed, and the mineral appears colors such as the covalent-bonded (shared electrons) diamond.

Between the two example there are what is known as semiconductors. These are minerals in which the atoms are held together with different bond types and the thickness of the band gap varies which can absorb a range of energies (to different degrees) and create a variety of colors. Wavelengths of light energy that are greater than a given band-gap width will be absorbed and excite valence electrons into the conduction band. In pyrite the band gap absorbs all of the visible spectrum but red and yellow are absorbed more and released to a greater degree creating the beautiful bronzy color. Where the band gap is small enough to absorb all of the light energy then the mineral appears gray light galena or black (e.g., magnetite and graphite). In some case the thickness of the band gap will absorb some wavelengths and allow others to pass. For example, in cinnabar the blue and violet light is absorbed but the red dominates the light that passes through to create a distinctive red color and vitreous luster.

The shiny lusters and distinct colors of some minerals is thus a magical interaction of light and atomic structure that product fantastic creations. So, the next time you polish a piece of gold, silver or copper consider the beauty of this natural process.

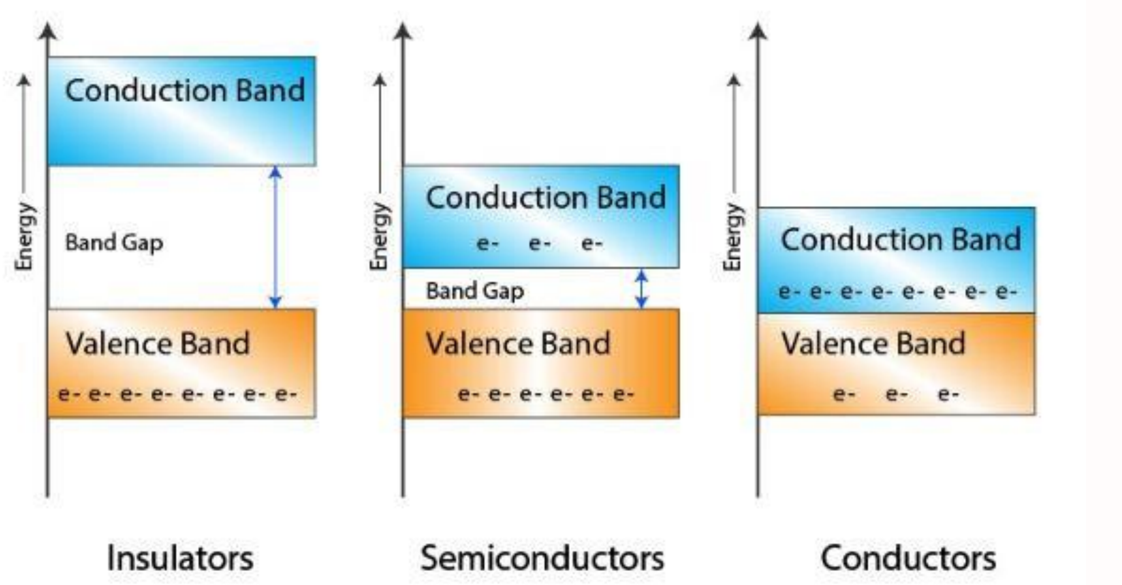

Figure showing the relationship between the valence and conduction band in different atomic structures. Metallic minerals such as gold are dominated by an overlap in the two "bands."

Click Image for link.