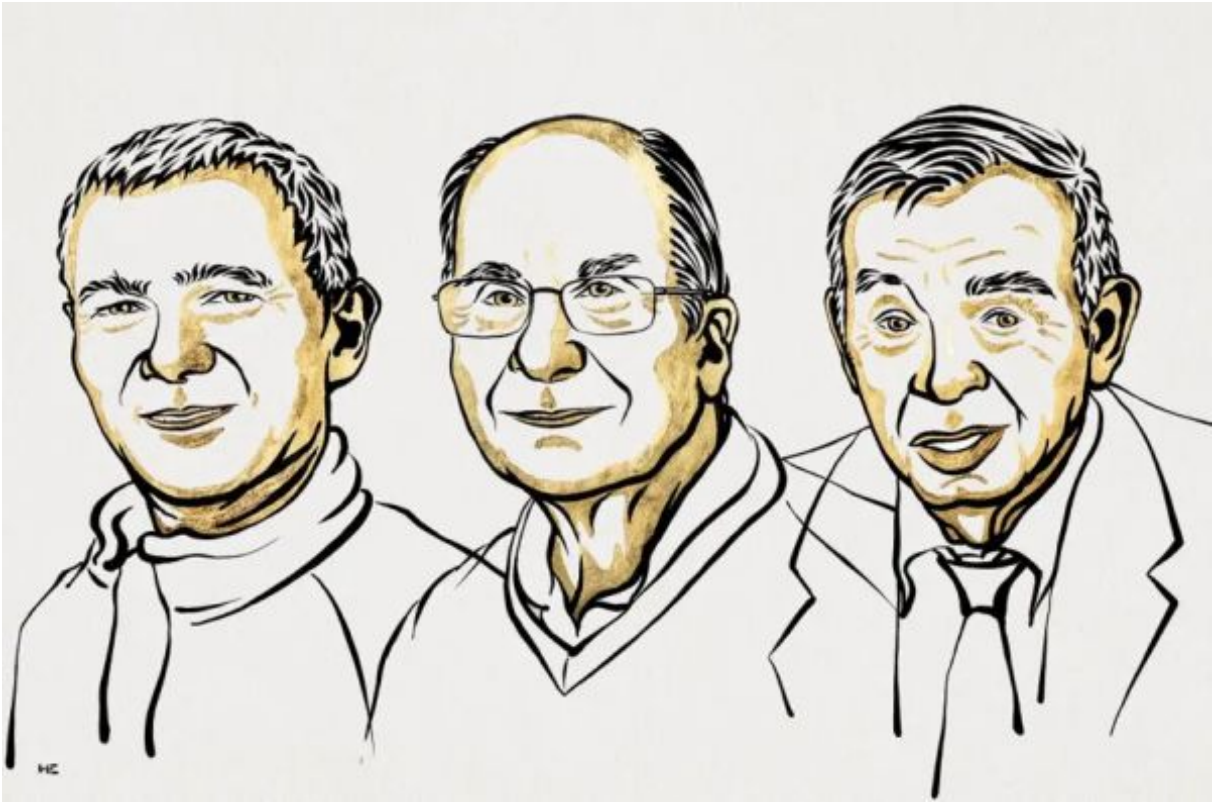

2023 Nobel Prize in Chemistry

Alexei Ekimov, Louis Brus, and Moungi Bawendi receive the Nobe i¿½for the discovery and synthesis of quantum dotsi¿½

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Mounji G. Bawendi, Louis E. Brus and Alexei I. Ekimov are awarded the Nobel Prize in Chemistry 2023 for the discovery and development of quantum dots. These tiny particles have unique properties and now spread their light from television screens and LED lamps. They catalyse chemical reactions and their clear light can illuminate tumour tissue for a surgeon.

On October 4th, the Royal Swedish Academy of Sciences announced the winners of the **2023 Nobel Prize in Chemistry**, naming **Alexei Ekimov**, **Louis Brus**, and **Moungi Bawendi** as this year's laureates i¿½**for the discovery and synthesis of quantum dots**i¿½. This represen s the second Nobel Prize announcement this year for Photonics related achievement . ICFOnians congratulate these fellow scientists and celebrate the formative influence th y have had on this field, paving the way for work carried out by researchers around the wor

d including at ICFO in the area of quantum dot
. Everyone who studies chemistry learns that an element's properties are governed by h
w many electrons it has. However, when matter shrinks to nano-dimensions quantum
phenomena arise; these are governed by the size of the matter. The Nobel Laureates i
Chemistry 2023 have succeeded in producing particles so small that their properties ar
determined by quantum phenomena. The particles, which are called quantum dots, are no
of great importance in nanotechnology
¡¿½Quantum dots have many fascinating and unusual properties. Importantly, they have
different colours depending on their size,¡¿½ says Johan Aqvist, Chair of the Nob
l Committee for Chemistr
. Physicists had long known that in theory size-dependent quantum effects could arise
n nanoparticles, but at that time it was almost impossible to sculpt in nanodimension
. Therefore, few people believed that this knowledge would be put to practical us
. However, in the early 1980s, **Alexei Ekimov** succeeded in creating size-dependent quantu
effects in coloured glass. The colour came from nanoparticles of copper chloride and Ekimo
demonstrated that the particle size affected the colour of the glass via quantum effects
A few years later, **Louis Brus** was the first scientist in the world to prove size-dependen
quantum effects in particles floating freely in a fluid
In 1993, **Moungi Bawendi** revolutionised the chemical production of quantum dots, resultin
in almost perfect particles. This high quality was necessary for them to be utilised i
applications
¡¿½For those of us working in the field of quantum dots, this award came as no surprise!¡¿?
, comments **ICREA professor at ICFO Dr. Gerasimos Konstantatos** who leads the Functional Optoelectronic Nanomaterials research group at ICFO and who has himself made multipl
noteworthy contributions to the areas of light emission, photodetection and renewabl
energies using quantum dots especially in the infrared. ¡¿½The potential of this new material platform to disrupt a broad range of markets has been obvious to us, thus our efforts to advance the field from the fundamental discoveries of the awardees towards highly performing devices, be that a photodetector, a light emitting diode, a laser or a solar cell, o
even competitive products. We are grateful to them for opening up such a ?broadband
material platform for us to use as a playground with the potential to transform it into valuabl
technologies for society."

"While the most well-known and established commercial products leveraging the unique properties of quantum dots are based on their favourable light emitting properties in the visible part of the spectrum for high definition TV screens and efficient lighting systems, we can expect a lot more in the near future," explains Konstantatos. "The next technology breakthroughs of this material class will be on revolutionizing infrared photodetector and image sensor technology featuring low-cost and high volume manufacturing for applications?
in automotive, AR/VR, robotics, safety and surveillance etc. Those applications are based o

quantum dots in ensemble, i.e. comprising millions of them close-packed in thin films Further down the road we envision isolating and using only one QD per device, in the form o an artificial atom, where they can be used as single photon sources or sensors. That will ope a new path towards scalable quantum materials and technologies for quantu communications and information processing. None of this would have been possible withou the pioneering discoveries of the awardees some 30 years agoi¿