So this is, one, why this matters for today.

So, look, I mentioned that getting red was hard back in the day for color TV, because the red phosphorus were difficult to make.

For LEDs, it was blue.

In fact, there was a lot of work around gallium nitride.

Here's gallium nitride in one structure.

Notice this.

There's gallium nitride.

It's not on here.

Darn it.

Gallium nitride in other structures have different gaps.

Oh, there it is.

There's one.

But the point was they wanted blue.

They wanted blue, and they needed to make a material that was both cheap to make and lasted, so it didn't degrade, and gave you a blue light.

And that was really hard.

And that's what the Nobel Prize was given for in 2014.

Because without blue, you can't make white light.

So there's all sorts of technologies you simply can't go into with LEDs until you get blue.

How did it happen?

It happened because of chemistry because people figured out how to change the how to take one element another element and then maybe alloy them together.

Maybe you take gallium nitride and you alloy a little bit of aluminum in here.

That means mixing it in.

Now, all of a sudden, you've got a different band gap.

Band gap engineering is really the centerpiece of the semiconductor revolution.