But this does get me to the why this matters, which has to do with how you cook pasta.

And, of course, since we're talking about O2, when I have finished cooking pasta, what do I do?

I pour it.

There it is.

It's like it's sophisticated.

I pour it through a colander.

That's a membrane.

That's a membrane.

You did use a membrane.

You did a filter.

Now, but I could also have done that separation, that same separation, I could have left it on the stove.

I could have.

And it would have boiled out all the water and left me still with the pasta separated from the water.

I've accomplished the same exact thing.

I have separated the pasta from the water.

Test done.

Pasta may not taste as good.

[LAUGHTER]

But you've done it.

But see, the thing is that if you separate things this way versus that way, you can just feel how much less energy it's going to take.

In fact, you can save over 80% of the energy if you do a membrane based separation as opposed to a thermal one.

Gazuntite.

So those are two ways to separate pasta.

But see, there's two ways to separate lots of things.

Like how about 1 to 10 nanometer particles?

How about chemistry?

How about molecules?

How do you separate those?

Well, you got the same two ways.

And if you count up all the things we separate this way, it's a lot.

It goes on and on.

And it will go all the way down the Infinite Corridor.

And this is how we do chemistry.

In fact, has anyone seen this on the side of the road?

That's a distillation column.

It's a big pasta cooker.

That's all you're doing is boiling one molecule off of another over a long time with a whole lot of fossil fuel.

In fact, if you look at the US energy consumption, roughly a third of it goes into industry.

40% of that is for this one thing.

It's boiling pasta.

But the pasta is 1 nanometer to 10 nanometer particles.

40% goes into boiling one chemical species off of another.

Separation.

Separation.

That's 12% of all the energy.

That's the same as every single drop of gasoline in every single car truck and bus.

Just to give you a sense of how much energy that is.

You'll say, well, why aren't we using a colander?

Why don't we just pour it through a colander like we do our boiling pasta?

Well, we do that for one field.

Desalination.

I got a [INAUDIBLE] on that another time.

But we don't do it for all those other things.

And there's a really simple reason.

We don't have the right pasta colander.

We don't.

There's no option for that size scale that can withstand the conditions that are in all of those chemical separations.

But if we did-- we take so much O2 out of the air.

We need O2.

But we don't want the N2.

So we have to separate it.

How do we do it?

We go cryogenic.

We go to very, very cold temperatures, which is the same as boiling.

Right.

But you're still spending all this fossil fuel to lower the temperature.

That's how much O_2 we generate each year.

And this is how much energy it takes.

It's like 1/2 a percent of all US energy, just to get-- But what if you could use something like O_2's paramagnetism?

What if you could use something about the chemistry or O_2 to do this separation more efficiently, lower energy, or maybe make a new colander that does that?

And if any of you have ideas, come talk to me.

This is a problem I care a lot about.