

Everything is made of something

An interview with Mark Miodownik



Mark Miodownik (OE 1982-87) is a materials scientist and Professor of Materials and Society at UCL, where he teaches and runs a research group. He is an engineer, broadcaster and writer who has popularised science and engineering. He was included in The Times 2010 list of the top 100 most influential people in science and has won numerous prestigious awards. Mark supports research that links the arts and humanities to materials science, medicine and engineering.

What are your most vivid memories of the School?

I haven't been back since I left but I do remember walking down the drive to School every day. You had the feeling of leaving London and your other life behind. You had to develop a thick skin to survive and protect yourself.

It is an amazingly beautiful place and has got that incredible setting which seems timeless. I remember it really well, the size, getting the hang of the layout, afternoons at 3 o'clock looking out of the window and those strange moments when you daydream in a lesson.

I remember the house system and having that sense of identity with your house. Also report cards are a really strong memory.

Do you remember any teachers?

I think Mr Pennell was our Chemistry teacher and Mr Ellis was our Physics teacher. Dr Foot was my Form teacher.

They were all good teachers. I now see in retrospect that they were waiting for students to wake up and ask them interesting questions, which for me was only really in the Sixth Form. I remember Mr Ellis sending me home with equipment for Physics because he thought I would be interested in doing experiments at home on my own - and he was right.

Was this when you got interested in Materials?

I remember mapping my whole house out in terms of the materials in it and working out why the heating bills were so high and all that sort of thing. At the time I was just obsessed and doing it for the fun of it. It is very, very geeky - I realise that now - and in those days that was not a good thing.

What challenges does materials development need to address in the next decade?

Weaning ourselves off fossil fuels is going to take the next 50 years. I think it is one of our biggest challenges. Renewable energy is essentially a big materials question. Can we make cities harvest our energy through the buildings and the roofs, can we get wind turbines to do more and can we get nuclear power stations to work in the way we want to? Will we be making biofuels or will electric cars be the future? I think electric cars are the future because we already have an electricity network. Batteries and energy storage are going to be a big, big deal.

The other challenge is health. Our health service can do amazing things like give you a titanium hip replacement so you can have mobility for an extra 20 years. In the labs that we work in we are actually replacing body parts - livers, kidneys, hearts, potentially even parts of the nervous system. All this is on the cards in the next 20/30 years and it will change health outcomes quite radically and change society.

You might think that you need to go into medicine to work on these sorts of developments but actually materials science is probably the best place to be.

Are you optimistic that we will find a sustainable alternative to plastic?

No, it won't happen soon and in fact we need plastic in our lives. A lot of what makes us modern humans is to do with plastics but we can't just keep pumping oil out of the ground and making materials from it. We are going to have to make plastics from other food stocks but more than that we are going to have to work out how to recycle plastics.

Where do you think that change needs to come?

We need to move towards an economic model where we don't produce waste anymore, where you design something like a shoe or a phone or a chair or even a car so that when it reaches the end of its life you know exactly how all of those ingredients are going to go back into the manufacturing cycle. It's called the circular economy. The world's resources are finite and we should be designing things to last longer. Washing machines, for example, used to last 15 years. They now last on average eight years. Why are we creating things to last less time?

It is often cheaper to buy a new product than to replace the part that is faulty. This is madness from an environmental point of view because of the waste, both in terms of material waste but also the energy waste and the cost of transportation. Will we change voluntarily or will we be forced into it? That I can't predict! I imagine it will take us 50 years to get there but we need to get there. We will get there.

You have previously said that you think we should replace A-levels with the International Baccalaureate?

I think if you agree that education is meant to prepare you for many different futures and that you probably won't have one career in your life, it feels to me obvious that choosing a small subset of subjects at age 15 or 16 is not going to prepare you for that. Unless you know for a fact that you are never going to want to use a computer or maths, why would you give them up at age 15? You are going to have to use them so you shouldn't give them up. We are one of the few countries in the world that makes you choose to be so specialised, so early. I am not saying that it has to be the Baccalaureate but we have to broaden our current system.

I would go further and get rid of GCSEs. At the time that people cram for exams, their brains and bodies are changing and they have enough stress. They don't also need to face public exams where they are going to be deemed failures or successes at age 15. Most degrees at university should be broad degrees; you are better off specialising at the Masters level. If you do a History or a Physics degree at university you are not getting a proper education, you are being too selectively trained.



What route did you take to get where you are now?

I worked for a year in an Engineering firm first and then I did a degree at Oxford and later a PhD. I also went to America and Ireland to work for a bit. It was only when I came back to London and got a job at King's College London that I realised that what I am good at is doing research and teaching. It took me a long time to work it out. I was always dabbling in lots of things but couldn't quite choose.

What advice would you give to any pupils reading this article?

Make things, connect the Physics and Chemistry to the Art and Design and History and Culture, it is all connected through making and it is deeply pleasurable. It opens a door to lots of things in the world. Don't feel you just have to be academic.

