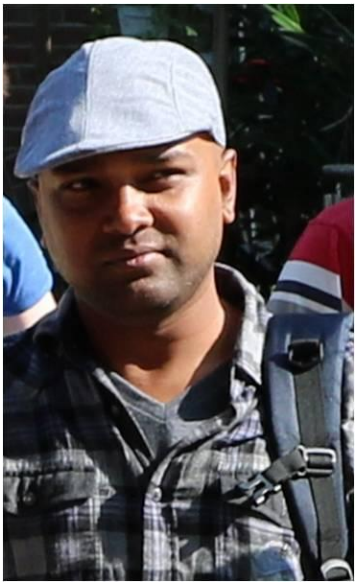
Project: Self-propelled particles to enhance catalysis

"We will study in detail the mechanisms of model systems of self-propelled particles, especially in the bubblepropulsion regime. Additionally we want to extend the study to 3D and quantitatively study its behavior on the single particle level as a function of concentration." *
Dr Ajoy Kumar Kandar (UU)
** For a more detailed description, see below.*



Can you do a short presentation about you?

Hello, I am Ajoy. I am from India. I obtained my PhD degree from IISc, Bangalore, India in March 2013. After that I worked as a Dr. DS Kothari postdoctoral fellow in IISc, Bangalore, India. I am here for my second postdoc in SCM group, Utrecht University. My research is mostly focused on experimental soft matter physics.

How is living in another city like Utrecht?

Living in Utrecht is quite great. As I am from non-European culture, I really enjoy living here as an observant. People are very friendly and helpful. I really like the weather and culture of city but I do not like the food much.

Would you advice a friend to come to the Netherlands?

Yes. I would surely advice a friend to come to the Netherlands to pursue academics. The working culture is really nice. Language is not an issue here as everyone speaks good English.

How/why did you finish in Utrecht?

After obtaining my PhD, I really wanted to work as a postdoc outside India in a good laboratory. SCM group has strong research knowledge and good publication record and is one of the best laboratory in the world on soft matter physics. So when I had been offered this job, I was quite happy to accept the offer and come to Utrecht.

How did you become interested in science?

When I was in school, I got interested in science including mathematics. I tried to learn many aspects of science and I was amazed by many logical explanations of various natural things. When I moved to university, I got more interested in physics. My initial interest in physics was high energy physics and quantum physics.

Did you know right away that you wanted to be a research scientist?

During my university days, I found myself passionate mostly on theoretical physics especially high energy physics/quantum field

theory which is more fancy and interesting. I thought I would do my PhD on those fields. But later on I inclined towards experimental soft matter physics. I realized the importance of this field. This is the field where someone can get the opportunity to statistically and microscopically study many materials which have daily life applications.

What do you enjoy the most about your research?

I enjoy my research because it excites me to hunt for new materials, new physics, new concepts. When I see a new observation, explanation and results in the laboratory, I know that I am probably the first in the world to see this, and this fascinates me very much.

What is your biggest motivation?

I am basically a self-motivated researcher. To understand the physics behind any structure observed in microscopes, to find out the fundamental explanation of observed phenomena, to find something new in the world, always motivates me to continue working in science.

How do you see yourself fitting in the MCEC project?

MCEC is an interdisciplinary community. I believe it requires expertise from different disciplines to make a stronger community. Being a soft matter experimental physicist, I see myself fitting in my present project as I study self-propulsion of anisotropic colloids driven by catalytic decomposition reaction.

If you had a time machine and two beers, with which scientist would you like to meet?

I would like to meet Prof. Richard P. Feynman. He is a very good high energy physicist and an excellent teacher of physics. During the meeting I would like to know his presentable skills and explanation procedure in teaching class. In addition, I would be curious to know his opinion on soft matter physics and I would ask a question like: “did he ever think of doing some research in this field”.

Which is the most memorable “Eureka” moment in your life (not necessarily connected to science)?

It is quite difficult to say a most memorable “Eureka” moment in my life. I would say a big Eureka moment is waiting for me in the future.

Which scientific term/phenomena you think is the most misused by media?

There may be many terms and phenomena, but somehow no specific one comes to mind at the moment.

What do you like to do in your spare time?

Watching movies, drinking, watching comedy tv shows, eating, watching science and philosophy based interviews etc.

Is science the answer to everything?

I would have to say no. However, science always helps to think in many

different ways and explain many natural aspects logically.

What do you want to do after finishing your postdoc?

I am basically more inclined towards the academic field. So I would try to find a job in academia and continue my research in soft matter and biophysics aspects. If in case I do not find a suitable job in academia, I would try to find a R&D job in a company.

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"Particles half-coated with a metal or other material that catalytically decomposes H2O2 are used extensively as a model system of self-propelled particles, albeit almost exclusively in 2D. Because of the catalytic decomposition reaction, which drives the particles far out of equilibrium, many new phenomena of Self-Assembly and pattern formation occur in these systems. As the mechanisms of self-propulsion in this system are still poorly understood, especially in the bubble-propulsion regime, we will study these in detail. We will use a new bulk synthesis method and systematically change the surface polarity of the catalyst. Here we also want to extend the study of this model system to 3D and quantitatively study its behaviour on the single particle level as a function of concentration. We will also apply external electric fields to anisotropic self-propelled systems, so that the rotational motion of the particles can be influenced. In addition, we want to explore and optimize this system for (two-phase) catalysis systems, for instance to improve mixing, prevent catalyst-particle clustering, and reduce boundary layers around the catalysts."