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"The types of materials that we create are highly fluorescent and they are very sensitive to their ambience or surroundings. So we are trying to use this for diagnostic purposes, mainly for the detection of certain diseases at an early stage. And this is a dream project which we are now trying to pursue."

A. Ajayaghosh

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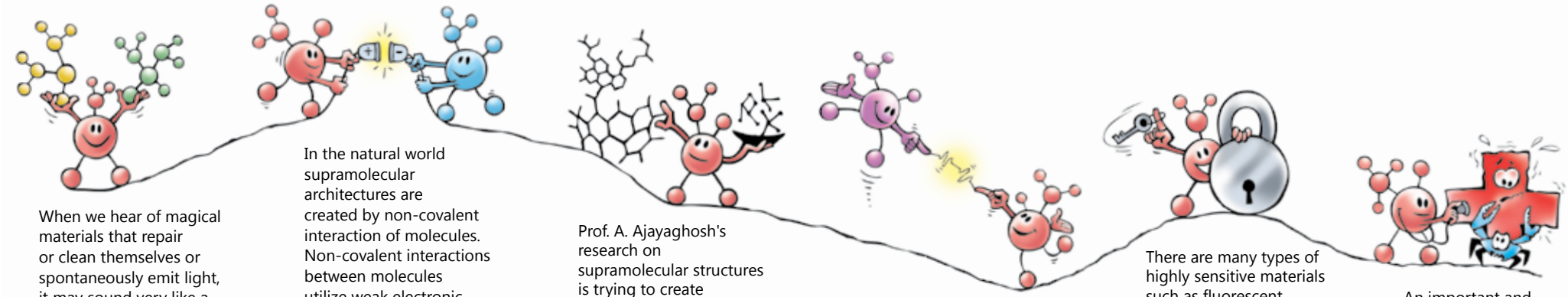
- M.Sc. in Chemistry from Calicut University
- Ph.D. in Chemistry from Calicut University

Dr. Ajayaghosh's landmark research in advanced supramolecular chemistry, most specifically in investigations that have led to the design and synthesis of molecular assemblies called organogels (pi-gels), a new class of materials with great potential for photonic and electronic applications. He has demonstrated that these self-assembled nano materials can be used to control the electronic energy transfer processes, paving the way for the development of superior light harvesting devices.

Discovering the secret language of molecules



When we hear of magical materials that repair or clean themselves or spontaneously emit light, it may sound very like a Harry Potter novel, but it turns out that scientists are like wizards who can create such magic material by harnessing the properties of molecules. For example, organic electronics has been used to invent novel devices after extensive research in supramolecular structures, which are made of large molecules formed by grouping or bonding smaller molecules together.

In the natural world supramolecular architectures are created by non-covalent interaction of molecules. Non-covalent interactions between molecules utilize weak electronic forces such as hydrogen bonding, pi-stacking and electrostatic forces. When different types of molecules of different sizes and shapes are put together, they are able to 'communicate' with each other.

Prof. A. Ajayaghosh's research on supramolecular structures is trying to create molecular architectures of different sizes and shapes using a special class of molecules that are electronically and photonically active. He has been studying how they interact in nature to create these architectures and if these can be mimicked in the laboratory.

Prof. Ajayaghosh's research is uncovering the process of how these connections could be converted to signals, which can then be used for certain kinds of applications.

There are many types of highly sensitive materials such as fluorescent materials which can be used for sensing other molecules. Such 'magic material' would be enormously useful in electronic devices and in creating security labels which are made of substance selective optical sensing materials for documents and currency.

An important and enormously useful application of Prof. Ajayaghosh's work would be for the early detection of diseases such as cancer. This could potentially be used as an important diagnostic tool and help with providing treatment in a timely manner.