

## In this issue

### Dye sensitized solar cells

‘I’d put my money on the sun and solar energy. What a source of power! I hope we don’t have to wait ‘til oil and coal run out before we tackle that.’

— Thomas Alva Edison

Humankind hungers for electricity. Humankind yearns for electricity. Indeed, over the years, our demand for electricity has only risen – and that at a fierce rate. But the world’s reserves of coal and oil – our primary sources of electric energy – are running out. Worse still, indiscriminate exploitation of these fossil fuels is exacerbating the deleterious effects of global warming. Of course, to alleviate global warming, and to reduce our dependence on fossil fuels, we are producing electricity by splitting atoms in nuclear reactors, building great dams across rivers, constructing wind mills, and even tapping into the sprouts of natural geysers. But the ‘green’ energy produced from these sources energy is simply not enough to satiate our hunger for electricity. Like ever hungry hatchlings, our beaks are wide open wanting more, and more, and more energy.

But there is a way out. Perhaps the *only* way out. We must turn to that singular source of immense, inexhaustible energy: The sun.

In the last few decades, we have made great strides in harnessing the sun’s solar energy. As a testament to the research in this field, over the years, we have developed many different kinds of solar cells that convert the energy of the sun’s rays into electricity. Today, around the world, scientists are feverishly engaged in the development of yet another kind of solar cell. A third generation solar cell whose working principle is very similar to photosynthesis: The dye sensitized solar cell, DSSC.

These DSSCs are superior to conventional solar cells in many ways. DSSCs are cheaper, and a lot easier to fabricate. *One can even fabricate a DSSC in one’s garage.* DSSCs, unlike conventional solar cells, can produce electricity even in the absence of sunlight. *Weak ambient light is enough to feed it.* DSSCs are a lot more robust and flexible in design. *One easily bend a wafer of DSSC, and it won’t break.* But even these solar cells are not without problems of their own.

Although cheaper than conventional solar cells, DSSCs are still quite expensive. They are, in other words, not yet a practicable alternative to fossil fuels. Furthermore, the inorganic dyes used in these cells are toxic and non-biodegradable. Considering the above, a Research Communication, **page 953**, presents an improvised version of DSSC that, instead of using expensive inorganic metal dyes, uses natural dyes extracted from pomegranates to produce electricity.

### Cough! Cough!

The capital of India, New Delhi, is one of the most, if not *the* most, polluted city in the world. This is not to say that the Delhi government has been nonchalant about the deteriorating air quality. On the contrary, the government has actively enforced several policies to rein in the rising rate of pollution. The government has, for instance, made it mandatory that all public transport vehicles be run on compressed natural gas, CNG. But these policies have been able to do little to improve Delhi’s air quality. *Simply too many industries. Too many vehicles.*

Air pollution, according to the WHO, is one of the leading health risks to human beings around the world. Indeed, every year around the world about eight hundred thousand people succumb to respiratory illnesses caused by air pollution. Surprisingly, however, few, if any, studies have examined the relationship between the prevalence of respiratory illnesses amongst the people of Delhi and Delhi’s worsening air pollution.

A Research Article in this issue of *Current Science* endeavours to address this lacuna in our knowledge.

This study tackles three important questions. The first question: During 2001–2010, did the air quality of Delhi continually improve, deteriorate, or remain constant? The second question: During 2001–2010, did there exist any correlation between worsening air quality and the number of people being affected by respiratory ailments? (Although the answer to the second question may appear obvious, there have been few studies that unequivocally testify to the same.) The third question: During 2001–2010, did the air quality of Delhi change as the

seasons – summer, monsoon, winter – changed?

Turn to **page 902** for the answers.

### Steeling STIP 2013

Growth of science and technology is the single most important capital for a developing nation. Germany and Japan, one of the most developed nations today, stand testament to this statement. Verily, even after being reduced to humble rubble by the ravages of the Second World War, both these countries developed at a fierce rate solely because of the high premium they placed, as always, on science and technology. Even countries ill endowed with natural resources, such as South Korea, boast of a strong economy primarily because of their prowess in the fields of science and technology. Considering the above, it is therefore high time that even India begins to focus more on supporting research in science and technology if it wishes to transform from a *developing* nation to a *developed nation*. The Science, Technology, and Innovation Policy-2013, STIP-2013, is a big step in that direction.

The ambition of the STIP 2013 is lofty. And of the many objectives it aims to accomplish, perhaps the most ambitious one is that by 2020 India must become a global leader in science and technology. But, obviously, it is one thing to chalk out a policy on paper; and quite another thing to witness the policy come to life.

The edifice of STIP 2013 would only be another castle in the air without the *steel* of a coherent strategy that would make it functional, and thus translate an idea on paper into reality. A General Article, **page 863**, examines certain issues that could thwart, in the near future, the actualization of the STIP 2013, and provides suggestions as to how the Indian government can surmount them.

In the words of Lord Blackett, there exists ‘no magic wand to wave over a poor country to make it a rich one’. It is therefore imperative that policies such as the STIP-2013 be realized to their fullest to ensure the metamorphosis of India – from a poor nation to a rich nation.

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