Quakerly Concern

Random acts of kindness are very good for our health and sense of well-being. Performing an act of kindness releases serotonin, a neurotransmitter (i.e. brain messenger) which has demonstrable health benefits, including making us feel happier. Not only does the originator of an act of kindness get a boost in his or her serotonin levels, but so does the recipient. Even those observing the random act of kindness benefit. The implications? We are hard-wired to be kind. By loving acts of kindness we overcome the world. (See Sonja Lyubomirsky's book, *The How of Happiness*.)

They needn't be random. Acts of kindness can be planned. We can build our life around making them happen. Whether attributed to serotonin, the milk of human kindness (Shakespeare), or to God's light within which enlightens every person, the underlying concept remains the same, that by nature we are inclined to do good, albeit we need to be attentive to our better angels. This is not Calvinistic Puritanism's doctrine of "Total Depravity."

Pure religion and undefiled before God and the Father is this, To visit the fatherless and widows in their affliction, and to keep oneself unspotted from the world. (*James 1:27*)

Quakerly concern is the informed, deliberate act of identifying real problems and addressing them: education, prison reform, slavery, war being examples. Thus it was, beginning in the 17th century, the Quaker movement built a superstructure of good works on a foundation of faith in God, scripture, and prayer. Some build superstructures with no foundation, others foundations with no superstructure. Come on now, we can do better than that! As Quakerism's leading light, George Fox said: "Let your lives speak." We can't just be waiting on God to do something; God's waiting on us to do something so as to come to our aid when we get in trouble; that's God's promise to us. But who will a hammer be and who a nail and who will build according to the Master Carpenter's plan? Wood, hay, stubble, silver or gold, what materials bring we to the great visionary building, which is the sacred body of our Lord?

If we can dream it, it's no fairy tale. But what if we're too weak to dream? Maybe that's a sign of our being too weak to live. The dream is that of Eden restored, of each family under its own fig tree, of the deserts abloom, of peace flowing down like a river. Mahatma Ghandhi, Martin Luther King Jr., and J. Rendel Harris dreamed such dreams and so can we.

The most important thing in a teacher's life is not to impart the knowledge of facts — which can be found much better in books — but to encourage another generation to look steadfastly at the vision which it sees, and to face its own problems in the light of that vision, controlled and guided by an understanding of what the past has done or not done." (Kirsopp Lake)

March 29, 2013

A new discovery by a pair of University of Calgary chemists could make the large-scale use of wind and solar energy more feasible.

Curtis Berlinguette and Simon Trudel have invented an environmentally friendly, highly customizable way to make a key component in a process that stores electricity by turning water into hydrogen fuel — at a price they say is roughly 1,000 times cheaper than current methods for making that component.

They published their method this week online in the journal Science Express and are currently trying to commercialize it through a new spinoff company called Firewater Fuel Corp.

Wind and solar energy are considered clean, renewable sources of electricity, but they have a major drawback — the amount of power they generate at a given time depends on the amount of wind and sun at that moment. That doesn't necessarily correlate with the demand for electricity at a given time, so in order to use wind and solar power efficiently on a large scale, there needs to be a way to store it for later use.

High-tech storage for green energy. Technically, electricity can already be stored cleanly by converting water into hydrogen and oxygen through a process called electrolysis, using a device called an electrolyzer. The stored chemical energy can be reconverted to electricity by recombining the hydrogen and oxygen in a fuel cell. It's a process similar to what happens in a battery and can be used in similar applications, including electric vehicles. However, hydrogen and water are cleaner storage materials than those used in batteries and fuel cells tend to be more efficient than batteries in a number of different ways.

Unfortunately, at a molecular level, breaking water down into oxygen and hydrogen is a "very complicated reaction" where many different things can happen over many steps, said Berlinguette. As a result, the reaction is normally too slow to be of practical use unless you compensate for the slow speed by adding extra electricity.

"If you don't have a catalyst, you'll probably need two or three times as much electricity as you should," Berlinguette said. Obviously, that's not very efficient, green or practical. A special type of compound called a catalyst can speed the reaction up and greatly reduce the amount of extra energy needed. But up until now, water electrolysis catalysts have been made of crystals containing rare, expensive toxic metals such as ruthenium and iridium.

Berlinguette and Trudel have invented a way to make catalysts that perform just as well as those expensive catalysts but cost 1,000 times less. The new process also allows catalysts

to be made from relatively non-toxic metal compounds such as iron oxide, better known as rust.

Infinite recipes: "Our method effectively translates to every metal in the periodic table," Berlinguette said. And because the new process is much more customizable than existing methods for making this type of catalyst, the recipe can be tweaked to include any combination of metals in any proportions to get the best possible performance. That means it may be possible to find a recipe that far outperforms existing, expensive catalysts.

The new catalysts and the process to make them are completely different from existing water electrolysis catalysts because they weren't originally intended to be used as catalysts. Trudel was studying them because he was interested in their magnetic properties. One day, he happened to be hanging out after work with Berlinguette, who was researching a different kind of catalyst.

"Truthfully, we were just chatting over a beer and [I] said 'Why don't we take your materials and see if they work as catalysts?'" Berlinguette recalled. "And they worked."

Traditional methods for making water electrolysis catalysts involve sticking an electrode into a solution containing the metal, causing crystals called metal oxides to deposit on the electrode. Mixtures of different metals don't work, Berlinguette said, because some of them de-posit on the electrode more quickly than others, forming separate layers rather than a uniform mixture that would make for a useful mixed metal catalyst.

The new method involves putting the metals in a scaffold of light-sensitive, non-metallic, carbon-based molecules and dissolving them in a solution. Different metals can be dissolved in the same solution and mixed evenly. The electrode is dipped in the solution and the solvent is allowed to evaporate, causing the catalyst-containing molecules to stick to it. The researchers then shine a light on the electrode, breaking down the light-sensitive scaffold and leaving behind just the evenly distributed metal oxides.

These metal oxides aren't crystals like traditional electrolysis catalysts, but "amorphous" materials with a less organized structure and gaps called "defects." The researchers think that is what makes them more reactive and therefore better catalysts.

According to the University of Calgary, FireWater Fuel Corp. plans to have a commercial electrolyzer available by 2014 and a home version on the market a year later.

KRISTEN BUTLER, July 1, 2013

An international team of chemists has introduced a new method for the desalination of

seawater that consumes less energy and is dramatically simpler than conventional techniques. The new method uses a chip to create a small electrical field that removes salts from seawater, and requires so little energy that it can run on a store-bought battery.

"The availability of water for drinking and crop irrigation is one of the most basic requirements for maintaining and improving human health," said Richard Crooks of The University of Texas at Austin, who led the research with Ulrich Tallarek of the University of Marburg.

Researchers applied 3.0 volts of electricity to a small plastic chip filled with seawater. The prototype "water chip" contains a microchannel with two branches. At the junction of the channel an embedded electrode creates an "ion depletion zone" that increases the local electric field compared with the rest of the channel. This change in the electric field redirects salts into one channel, allowing desalinated water to pass through the other.

Crooks and his colleagues have so far achieved 25 percent desalination. Drinking water requires 99 percent desalination, but scientists are confident in their "proof of principle" and say full desalination can be achieved.

The technique, called electrochemically mediated seawater desalination, is patent-pending and is in commercial development by startup company Okeanos Technologies. "People are dying because of a lack of freshwater," said Tony Frudakis, founder and CEO of Okeanos Technologies. "And they'll continue to do so until there is some kind of breakthrough, and that is what we are hoping our technology will represent."

Right now the water chip's microchannels, produce about 40 nanoliters of desalted water per minute. But the authors are confident the process can scale up to make it practical to produce liters of water per day. "Okeanos has even contemplated building a small system that would look like a Coke machine and would operate in a standalone fashion to produce enough water for a small village," Frudakis said.

- - -

Two diametrically opposed trends are operative in human affairs: one centralizing power, one diffusing power. If we are to be each one under his own fig-tree, it is because Big Ag didn't get its way. If we have the ability to make our own power and get off the grid, it is because the power companies did not get there way. If we are to be healthy and vaccine free, it is because the pharmaceutical companies did not get there way. If we are to have constitutional money, not fake FED money, it is because the International Bankers did not get there way. Keep the faith, baby! With Heaven's help, we can do it, yes we can!