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ELECTRO-ACCRETION: GROW SHELTERS FROM SEA MINERALS

For millions of years, coral and mollusks have been bioelectrically accumulating minerals from the ocean water into an amazing variety of living structures. Our cities and freeway systems appear insignificant when compared with the Great Barrier Reef, by far the largest fabricated structure on Earth. By following the coral's example, we have a harmonious building technique with many advantages over conventional land-based methods.

Professor Wolf Hilbertz of Galveston, Texas, discovered that a coral-like shell will build up on any negatively charged wire mesh framework, submerged in seawater near positively charged grids. The wire mesh doesn't corrode since the initial layer of electrodeposited material protects it. This simple, inexpensive process can be used on a large scale to grow homes, ships, pipelines, piers, reefs, structural members for large buildings, and artificial islands.

The shell resembles limestone, and is mainly compounds of calcium carbonate and magnesium hydroxide. It is lighter and stronger than reinforced concrete, able to withstand pressures exceeding 4200 pounds per square inch.

Twelve volts at 2 or 3 amps is enough to accumulate shell on a small boat-sized frame at a rate of about a half-inch per month. More current produces swifter growth, but optimum crystal strength occurs with slow accretion, at between 5 and 100 milliamps per square foot of material.

A unique feature of electro-accretion is the option of healing damaged structures by re-connecting the charge and submerging the fractured portions. Fresh minerals fill in the cracks and strengthen the entire unit. The same process can even be used to repair and reinforce existing marine structures on site.

Electro-accretion offers a simple solution to the threat of contamination from offshore toxic and radioactive dump sites. Just drop wire cloth over the sites, turn on the charge and leave it on, adding more cloth layers as needed. An impervious shell will build up at about 5-6 inches a year, and fuse with the sand underneath.

Broad use of electro-accretion could greatly reduce the strain on our dwindling forests. With wire, electricity and labor as the only costs, prefabricated building components can be produced much less expensively than their lumber counterparts, except in remote inland regions. Yet despite the enormous potential, this option is still practically unused.

The steel in one decommissioned battleship, if drawn into wire mesh, is enough to weave the electro-accretion framework for an artificial island big enough for half a million people.

Professor Wolf Hilbertz is at Marine Resources Company.