RADIAL COUNTERFLOW SOLUTIONS

Vorsana Shear Electrolysis Reactor

Continuous Cracking of Carbon Dioxide and Water into Syngas

In the Vorsana™ Shear Electrolysis Reactor, a variant of the McCutchen Processor™, carbon dioxide is cracked by shear electrolysis and converted into syngas ($CO + H_2$).

The electrical potential for electrolysis comes from counter-rotation of conductive coaxial disks through a transverse magnetic field (the homopolar generator, Faraday disk, or disk dynamo). There is a high opposite radial current flow through the disks, which are oppositely charged impeller/electrodes for the axially fed feed being sheared between them. Cracking is assisted by shear, and anisotropic turbulence clears gas from the electrodes and advects electrolysis products in radially opposite directions, separated by centrifugation in organized turbulence (i.e. radial counterflow). Oxygen and axially fed CO_2 and water are advected radially outward in boundary layers against the charged impellers, while the lighter syngas flows radially inward through radial vortices of the shear layer between the impeller/electrodes and is withdrawn through an axial exhaust conduit. Ozone and valuable solid carbon are extruded from the periphery.

The Vorsana Shear Electrolysis Reactor provides means for carbon recycling into syngas at IGCC power plants, and for recovery of valuable carbon products and ozone from waste CO_2. It is preferable to the "sequestration" (dumping underground) approach because it provides a profit motive to solving global climate change, by turning trash into treasure.

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