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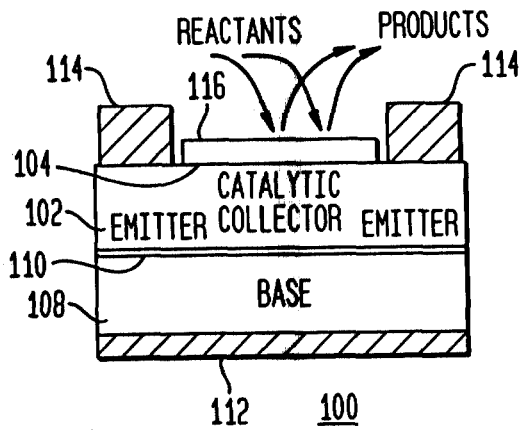
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(54) Title: SOLID STATE SURFACE CATALYSIS REACTOR



(57) Abstract: A method and apparatus to stimulate chemical reactions on a catalyst surface (116) using electricity, and the reverse process to convert energy released from chemical reactions into electricity. A reversible emitter (102) generates electrons which are injected into reactants on the catalyst surface (116), exciting chemically reactive vibrational resonances. Hot electrons created in the emitter region of a semiconductor junction (110) diffuse to the co-located collector region and catalyst surface (116). Catalyst clusters or films bonded on the collector surface transfer the hot electrons to or from the catalyst surface (116) having adsorbed reactants. The dimension of the catalyst-collector (104) is less than the energy mean free path of hot electrons. The hot electrons excite reactant vibrations before thermalizing with the substrate lattice thereby accelerating reactions. The hot electrons are also generated by the same reactions on a catalyst surface. The method and apparatus is reversible and may be operated as an electric generator using chemical reactions.