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MAGNETIC COVALENT BONDS OF CARBON

Theory

1. Theory of potential use of carbon gases to release the kinetic energy in carbon oxide and carbon dioxide with the use of magnetic force that can break the oxygen bonds that in result provide high kinetic energy and can form dioxide and trioxide. Just like in the standard coal burning steam engines it takes some time to ignite the coal, but once it is ignited it burns for a long time and thru its slow release of energy it keeps on burning for a long time.

2. Similarly, I like to think about atmospheric carbon containing gasses such as carbon monoxide and carbon dioxide, if we could find a way to introduce this mechanism to carbon gases to extract energy used to bond carbon to oxygen atom using electromagnetic properties of oxygen and carbon that allow to snap of the atoms from each other with a certain field strength and spin we could harvest its kinetic bond-energy and possibly other beneficial biproducts such as oxygen or ozone.

3. Even if harvest of carbon compounds covalent bonds energy is not possible to harvest the technology that simulates carbon bonds to break the carbon connection can be extremely beneficial in carbon capture technology that uses electromagnetic filed instead of currently used filtration systems. Electromagnetic carbon capture by separation of carbon compound gasses can also provide oxygen and ozone as a biproduct of carbonization of carbon gasses.

Summary of the Concept

4. You propose a Theory of Carbon Gas Reignition: use magnetic and electromagnetic fields to break C–O bonds in CO and CO2, liberate high-kinetic-energy carbon (or activated carbon species), and harvest that bond energy for mechanical work (for example in steam engines) while producing oxygenous

byproducts such as O2 or O3. Below I translate that intuition into a concrete, testable concept, show plausible physical and chemical mechanisms that could support it, outline experiments and engineering pathways, and identify key energy-balance and safety challenges that must be resolved.

Physical and chemical mechanisms that could plausibly support the idea

- **Magnetic field enhanced electrochemical CO2/CO conversion**
  - Laboratory work shows that applying magnetic fields can change rates, selectivity, and energy required in electrochemical CO2 reduction processes, lowering energy consumption and steering product distribution toward value-added carbon products.

- **Magnetically active catalysts and magnetic cluster activation**
  - Magnetic metal clusters (iron, nickel, cobalt) can adsorb and weaken the C–O bond in CO and CO2; DFT and experimental studies report increased C–O bond length and decreased vibrational frequency on magnetic cluster surfaces, indicators of bond activation that lower dissociation barriers.

- **Field-driven dissociation and strong-field ionization**
  - Extremely strong electromagnetic fields and ultrafast lasers can ionize and dissociate CO and CO2, producing energetic fragments; studies characterize ionization yields and nonsequential processes under intense fields.

- **Magnetic nanoparticle heating and localized thermal desorption**
  - Magnetic nanoparticles heated in alternating magnetic fields can provide highly localized heating to drive desorption or chemical release (patented approaches for CO2 capture/regeneration).

5. Together these findings imply that magnetic or electromagnetic fields, combined with magnetically responsive catalysts or localized heating, can facilitate CO/CO2 bond weakening and conversion rather than naive direct “snapping” of atoms in free atmosphere.

Concrete mechanism proposals and how they map to engineering

1. **Magnetoelectrocatalytic dissociation cell**
   a. Concept: a flow cell that combines an electric potential with static or dynamic magnetic fields across a magnetically active cathode/anode made from Fe/Ni/Co alloys or magnetic nanoclusters immobilized on conductive supports.
   b. Function: CO2/CO is reduced/activated at the electrode interface; magnetic field modifies charge transfer, spin states, and local mass transport to favor formation of C-rich products or reactive carbon fragments that can be extracted or reacted into useful high-energy intermediates.
   c. Measurables: Faradaic efficiency for C products, energy per mole CO2 converted, selectivity vs H2, surface spectroscopy showing elongated C–O bonds.

2. **Magnetically heated sorbent regeneration and localized dissociation**
   a. Concept: amine- or MOF-based capture of CO2 bound to magnetic nanoparticles; apply alternating magnetic field to selectively heat the sorbent–CO2 adduct, causing localized bond rupture and release of CO2 or activated fragments; follow with downstream activation stage (plasma or catalyst) to dissociate released CO2 into O2 and carbon species.
   b. Function: reduces bulk heating energy, concentrates CO2 for subsequent high-field processing. Measurables: energy per kg CO2 released, sorbent cycle stability, desorbed species composition.

3. **Magnetic cluster surface activation with steam shift integration**
   a. Concept: expose CO to magnetically active catalytic surfaces that weaken C–O; couple with steam and/or catalysts to favor the water–gas shift or partial oxidation routes that produce H2 and CO2 or deposit elemental carbon on surfaces (carbonylation or Boudouard variants). Harvest kinetic energy via exothermic reactions driving steam cycles.

b. Function: converts CO/CO2 into streams usable by existing steam machinery or into deposited carbon that can be burned/pyrolyzed controllably. Measurables: reaction enthalpies, carbon deposition rate, overall thermal-to-mechanical conversion efficiency.

4. **Strong-field pulsed activation for research-scale proof**
   a. Concept: use ultrafast pulsed lasers or strong transient EM fields in vacuum or low-pressure gas to create and study dissociation pathways and energetic carbon/oxygen fragments, measure cross sections, fragment energies and lifetimes. This is primarily a physics/chemistry diagnostic to verify whether energetic carbon fragments can be formed and captured.
   b. Function: map feasible parameter space (field intensity, pulse duration, pressure) before scaling to catalyzed/steady systems. Measurables: ion yields, fragment kinetic energies, required field strengths.

Energy balance, thermodynamics, and likely limitations

- Bond energy baseline: C–O bond dissociation energies in CO and CO2 are high; direct dissociation is endothermic and requires substantial input energy. Any practical scheme must either (a) use low-energy catalytic pathways to shift reaction networks to exothermic channels, or (b) be powered by low-cost renewable electricity and convert energy with high selectivity so usable energy exceeds inputs.
- Magnetic/electromagnetic assistance is not a free energy source: fields influence rates, selectivity, spin states, and localization of energy input but do not lower the total thermodynamic energy required to break bonds beyond chemical catalysis and redox balancing.
- Practical outcome is most likely: produce reduced carbon chemicals (CO, hydrocarbons, carbon deposits) or H2 via water-gas shift and electrochemical reduction—these can supply energy to steam cycles—rather than isolating free high-kinetic-energy carbon atoms in air.

Safety, materials, and environmental considerations

- Oxygen and ozone byproducts: O3 formation can be toxic and corrosive; control and containment are mandatory. O2 production can be beneficial but must be separated safely.
- Reactive carbon fragments and particulates: energetic carbon fragments and deposited carbon can ignite or form fine particulates; robust capture, filtration, and controlled reaction pathways are required.
- Catalyst and sorbent longevity under intense fields must be validated; magnetic nanoparticles can sinter or degrade under heating and field cycling.
- Life-cycle assessment should compare total system emissions and energy use to alternative decarbonization or energy recovery routes.

Recommended next experimental steps you can start immediately

1. Literature synthesis and parameter scan
    a. Systematically review magneto-electrochemical CO2 reduction papers to identify catalysts, field strengths, cell geometries, and reported energy savings.
2. Small-scale magneto-electrochemical test
    a. Build a bench flow cell using a magnetic cathode material, measure current, products, and energy per mole CO2 converted with and without magnetic field.
3. Magnetic sorbent prototype
    a. Prepare amine-functionalized magnetic nanoparticles and test CO2 uptake and magnetic-field desorption energy versus thermal regeneration.
4. Collaborate with ultrafast laser group
    a. Commission short diagnostic experiments to quantify minimum field/pulse conditions to produce energetic carbon/oxygen fragments in low-pressure cells to inform feasibility of fragment capture.

Assessment of feasibility and expected outcomes

6. Feasibility Summary: The core idea of using magnetic and electromagnetic filed effects to assist CO/CO2 atoms separation is grounded in current research, however more studies related to magnetic

field effects on various atmospheric gasses show that new scientific break thru will be in atomic magnetism that allows to control compounds and energy. Atomic magnetism is the future.

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