

The Many-Faces of Nano-Chemistry

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Abstract. Nano-chemistry is presented from the *political-economical-societal-technical-environmental-juridical-and-cultural* perspectives, with certain considerations and predictions on its implications in the nowadays and future life on Earth.

Keywords: *nano-science, nano-technology, new philosophy of science, grand unification, futurology.*

Nano-chemistry is the new Chemistry! The Future of Chemistry and of Molecular Physics! The chemistry of arranging atoms by lasers or by other means in molecules may control their structure like never before. The structure, at its turn, is designed with pre-settled properties. The nano-synthesis, nano-analysis, nano-structure and control! In fact, Nanochemistry marks the return of Chemistry in the “Physical Garden”, although maintaining its paradoxes, and fuzziness while posing reactivity (i.e. coordinate of reaction) and biological activity (the bonding at distance, through cellular membranes, by stacking, by non-covalent and even by non-chemical yet mechanical mechanisms – see the molecular interlocked mechanisms within newly designed molecular machines, etc.).

And yet, the many faces of Nanochemistry are also at macroscopic, even societal level, from where its importance in the present future and next generation of nanosciences and nanotech! Enough discussing here, for instance, the connection of Nanochemistry with the fundamentals of strategic management as applied to nanotechnologies, from the **PESTEJEC** (*political-economical-societal-technical-environmental-juridical-and-cultur-al*) perspectives:

- **Political:** as far it can be seen at the beginning, “political nanochemistry” is a soft tool of power that provides certain cures of mass population or individual rare illness, often as a promised strategic direction of some political groups when address their aspiration to lead the nations; in simple words, the connection of nanochemistry with *population health*, and the promises of the future cures, vaccines, treatments, belong to political (not necessary bad) face of nanochemistry nowadays and in the perspective;
- **Economical:** when it is about (natural) resources, nanochemistry may provide the best near future raw-materials, by various syntheses and re-using of materials, within the so called circular economy;
- **Societal:** the every day gadgets, and, more important the food for over 7 billions of individuals on the Planet Earth, that by no means cannot afford 3 time per day a bio-based

meal – from where the necessity to multiply or to condense the required minerals, proteins, carbohydrates, etc., in intelligent molecules, eventually with gradual delivery of the nurturing components; only the nano-synthesis and nanochemistry can offer the compromise between non-genetically altered ingredients while assuring the necessary chemical substrate for sustaining life and its functionalities at the large scale individuals;

- **Technical:** communication for the mass use and for the army special use of nanochemistry – are other fundamental pillars of nowadays and near future reality; whatever non-natural one may appear nanochemistry it is equivalent with the post-chemistry as the corollary of the post-modern society and technology, economy and way of life which, nevertheless, transformed the humans into post-humanity and nations into post-society, global economy into GLocal (global-local) sharing of varieties and specificities – to which, to all of which – only nanochemistry can constitute a common ground and a post-tech platform;
- **Environmental:** nanochemistry may provide the necessary shielding and influential tools on climate changes at molecular level, by changing specific soils, water, and atmospheric purity while controlling pollution; it can ultimately save the global warming by new mechanisms to produce and propagate frozen crusts at the Earth Poles, while still extracting the negentropy (by various volumes compressions vs. pressure compensations of certain nano-imprinted molecules) under the form of newly regenerating energy; Hydrogen on the other side, while it started being explored as the eventually best storage and renewable energy, in batteries, MOFs (Molecular Organic Frameworks) and by other nano-chemical environments, may be augmented with neutrons (by nano-injection) to produce various speeds and energy fuels, in graduate demands, both on a in-house or industrial use, through its deuterium and tritium isotopes (while on the last also radioactivity may be further integrated into an inner energy cycle, with a more expensive yet efficient combustion reserve);
- **Juridical:** nanochemistry appears on a realm of exotic atomic and molecular physics, with a trans-disciplinary exploit and implications; the barrier with the actual juridical (by man-hand) jurisdiction will be probably overcome, either by strategic national or communities enforcements, or, more softly, by organizing specific referendums resulting in a societal self-driving decisions (apart of inherent miss-information, fake-truths and other scientific and technical miss-warrants); overall, the odds of free-will of (by) nano-chemical protection should be carefully decided so that the singularity point (the point of no-return) from the local-and-global influence of nanochemistry in all living and future living forms of life and existence be considered sustainable, i.e., with the possibility of returning the effects if the users decided so;
- **Ethical:** the issue of nanochemical access and exercise, either by individuals as well as by companies, organizations, and even by nations, may equal, soon enough, with the XX regulations regarding the nuclear power; actually, the nanochemistry, as above stipulated, may be considered the new-physics on Earth, while leaving to Physics the so called higher grounds (the Universe exploration) and the invisible quantum realms (elementary particles, quantum information), although also pinching in that directions too (by Exo-Chemistry for Cosmos Chemistry and by Nuclear Chemistry for the elemental synthesis and even the reactivity of the elementary particles); consequently *a new philosophy of science* in general and of the nano-evolution (including the nano-progress) in special, with nanochemistry the driving engine as the middle interface in between Physics and Biology, for instance, should respond, and hopefully will solve, the odds against the human nature and free evolution;
- **Cultural:** Historically, Man was oscillating in being in the middle of Universe (viz. Parmenides' vision of a Man as the measure of all things), then passing on the orbit of a central God in various religions and doctrines, many of them nowadays fully active, yet

returning to some reciprocal relativity in between the Man's free-will (the Observer) and the Nature being Observed, with reciprocal interactions and no decisive central point; in post-modernism the attractors and repellers are mediated by indifferent actions, attitude (with no use) and producing just dispersive effects (life as an all-in-all river without a certain teleology); However nanochemistry has the chance to unify and to dismantle alike, like any force in Nature with negentropical feature, and that is an essential one for nanochemistry, that of reversibility, regenerating, and perpetuating information, and, at the limit also the life and evolution. Accordingly, nanochemistry may account merely on the *relationships* among all things it connects, interconnects or relate, so making the overall compromise among all participants (*stakeholders*) in a system, closed or open, from small signals to macro-amplification of causes and effects, this way controlling and driving in small amounts the information (substance, energy, and codes) that sums up in bigger effects ("how is it on Earth as in Heaven"/"How is it in Small as in Big it is!"). All in all, the holistic culture of relationships over that of entities being connected or virtually connected, created or synthesized, - may be the integrative true nature of nanochemistry! If this is good or not, it remains to be decided by the Beauty, the Truth and the Time it can add to the already crowded life heritage and aspirations of mankind! At the end, also an average yield should suffice for nanochemistry to prevail!