Self-Assembly of Organic Nano-Objects into Micro Scale Objects Induced by Cigarette Smoke

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The Indonesian Cigarette which consists of mixing plant materials produces smoke with huge number of chemical compounds. These chemical compounds used non chemical bound to form particulate. They usually are exited and have highly electron density position. Introducing this smoke with some amino acids, polypeptides or any biological related materials will construct structures with unique architectures. An important question: Is this indicating some biological like potential characteristic of the smoke in regard to develop functional materials?

Figure: Unique structure enable to be made after yeast extract materials exposed with Indonesian cigarette smoke

This smoke phenomenon might have analogy with highly exited and functional supramolecular structures in the living system. The supramolecular structures consist of compounds structured in complexes manners. The chemical bounds involved in the construction of supramolecule use of either non covalent bounds or some others non chemical bounds to develop supra molecular structures. The non chemical bounds are usually has magnetic, diamagnetic as well as paramagnetic power. In fact, every single chemical compounds, such as vitamin, lipid or even polypeptides, will only participate in the biological processes when they are in a complexes structure with other molecules or metals. The

understanding of these smoke phenomena and its analogy with supramolecular structure might have fundamental meaning to induce a wide open field for biological nano-materials-science research.

Our ability to design structures of low dimensionality will introduce novel properties in designed materials that are extremely useful in biological systems. Two-dimensionality of protein networks is a great tool for controlling the ability of cells to change shape reversibly. In the world of nanotechnology, we may benefit enormously from nanoscopic (nanoscale dimension) materials that have such capabilities as a result of external stimuli. Descending to one dimensional structure, we might be able to mediate transport phenomena and control the orientation of highly anisotropic microscopic objects. In this regard, our finding of Indonesian cigarette smoke phenomena shows us the power of complex structure similar to cytoskeleton dynamics in cells. In our finding, one-dimensional polar structures such as amino acid and polypeptide of yeast extract can be constructed into higher order structures by means of particulate of complex chemical compounds in cigarette smoke.

In our opinion, absolute control over the chemistry, shape, and size of zero-dimensional structures should be the ultimate goal. This could lead to a toolbox for materials of truly synthetic, protein-like objects that differ greatly in chemical structure from those observed in biology. The achievement of this goal will not only yield an enormous array of super-lattice materials with the same richness as organic crystals, but also the opportunity to mimic, in synthetic systems, the mysteries of signal transduction in biology. One exciting possibility would be to bring ligand-like and receptor-like nanostructures into contact to trigger changes in the physical properties of materials or in their shapes or dimensions.