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### Self-similar patterning of inversion domains in Al-Cu-Co decagonal quasicrystals

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We find a striking distribution of inversion domains in a decagonal $Al_{64}Cu_{22}Co_{14}$, which reveals a fractal-like, self-similar microstructure constructed by golden triangles (similar to a Sierpinski Gasket). This unique morphology of domains is confirmed to be thermodynamically stable configurations at high temperatures (> ~1200K), just below the melting temperature of the $Al_{64}Cu_{22}Co_{14}$ compound. Details of the domain microstructure are described based on dark-field TEM imaging, convergent electron diffraction and atomic-resolution STEM. We propose that the occurrence of such self-similar domains may well be understood by concerning structural modulations extended into a hyperspace.

Keywords: quasicrystals, electron diffraction, electron microscopy

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### Thermal stability study and structural of palladium platinum nanoparticles by HREM

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Platinum (Pt) Palladium (Pd) nanoparticles supported on amorphous silica ($SiO_2$) were prepared by wetness impregnation techniques at same concentrations of Pt(0.5) and Pd(0.5); 1 metallic wt %. The particle size distribution were measured as function of reaction temperature, temperatures were varied in the range of 200 ℃ - 400 ℃ to evaluate the nucleation phenomena and thermal stability. In addition morphology and crystallinity under various reactor temperatures were investigated by physisorption Brunauer-Emmett-Teller-(BET), X-Ray Diffraction (XRD), High Resolution Electron Microscopy (HREM) and Transmission Electron Microscopy (TEM). In this work, we observed the distribution of Pt and Pd in nanoparticles. The rational design of nanoscale structures for applications in technology increasingly relies on developing and improved understanding of processes, particularly in terms of how they contribute to the changing phase behavior of nanoscale systems. Crystal structures can be determined by X-ray, while transmission electron microscopy (TEM) is indispensable for characterization of nanocrystalline materials, because TEM is a tool that provides not only atomic resolution lattice images but also chemical information at a spatial resolution, allowing direct identification the chemistry of a single nanoparticle.

Keywords: nanoparticles, metals, HREM

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### Morphological studies on single crystals and nanofibers of poly(heptamethylene terephthalate)

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Poly(heptamethylene terephthalate) (PHepT), which is one of aromatic polyesters, was synthesized, and its lamellar single-crystals were grown isothermally, for example at 70℃, from a dilute solution in 1-octanol. Nanofibers of PHepT were prepared *via* electro-spinning (apparatus: esprayer ES-1000 (Fuence Co., Ltd.; Tokyo, Japan)) of a solution in 1,1,1,3,3,3-hexafluoro-2-propanol. Morphology of the single crystals and that of as-spun and annealed nanofibers were investigated with a transmission electron microscope (JEOL JEM-200CS) which was operated at 200kV. Selected-area electron diffraction (SAED) of the crystals gives a well-defined N-pattern consisting of spot-like *hk*0 reflections, and that of a bandle of the annealed nanofibers gives a highly oriented fiber pattern. From the analysis of SAED patterns for both types of specimen, namely single crystals and nanofibers, it seems that PHepT takes an orthorhombic crystal system and its unit cell parameters are as follows: $a$ = 1.409nm, $b$ = 1.480nm, $c$ (chain axis) = 3.392nm, $\alpha=\beta=\gamma=90°$. In addition, dark-field images of the PHepT nanofibers which had been annealed at 85℃ for 2 days were taken by using some of the reflections on/near the equator. The images showed a stacked-lamellar structure, in which crystalline lamellae are stacked in the direction of the fiber axis, and the corresponding average long period was estimated at about 19nm.

Keywords: polymer single crystal, nanofiber, poly(heptamethylene terephthalate)

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### EM Navigator - 3D electron microscopy data navigator

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EM Navigator (URL: http://emnavi.protein.osaka-u.ac.jp/) is our new web service for browsing the 3D electron microscopy (EM) structure data, based on the data form EM Databank (EMDB) and Protein Data Bank. It has been constructed so that even users who do not know well about 3D EM can see easily and pleasingly browse the 3D EM data. EM structure data have not been friendly. It is often very hard to recognize the 3D structures just by seeing the figures on the papers or the web pages. In case of atomic coordinates of proteins, we can easily get the 3D views using jV on the PDBj web site or opening the downloaded data using some famous software such as RasMol. On the other hand, it requires some skill and effort to make 3D views like the figures on the papers from data such as 3D maps deposited on the EMDB. The barriers are much higher to view the structure combined with the other data such as the atomic coordinates fitted into the EM map. We have been constructing movies for each the data entry in the EMDB, and embedding them on the EM Navigator web pages. You will get easily the 3D views with the detail information by the