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Atomic ordering periodicity and catalytic properties of nanoparticles VALERI PETKOV, Central Michigan University — Often nanosized particles of crystals are catalytically very active while the corresponding crystals are not. A typical example is gold. The enhanced catalytic performance of nanosized particles, however, does not come merely from their greatly enhanced surface-to-volume ratio. We would like to draw attention to the often overlooked fact that nanosized particles of crystals do not necessarily possess the periodic 3D structure of their bulk counterparts, and this too may impact their catalytic properties substantially. In particular, nanoparticles that do not have a periodic 3D structure may not come in a well-defined, faceted shape, i.e. may not be terminated by well-defined (usually high energy) atomic planes, as crystalline objects of the same size would be. Hence, nanoparticles may be catalytically more (or less) active than "nanosized" crystals. Results from recent structure studies (synchrotron XRD and computer simulations) on 1 – 5 nm Ru, Au and Pt particles will be presented as evidence.

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