



UNIVERSITÀ
DEGLI STUDI DI TRIESTE

Dipartimento di Scienze Chimiche e Farmaceutiche

AVVISO DI CONFERENZA

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Aula Grande dell'Edificio C6

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The unifying concept of empty space in catalysis and beyond

Lao Tze (ca 6th century BC, China) and Democritus of Abdera (ca 460 – ca 370 BC, Thrace) were not chemists but philosophers. Yet they both emphasized the importance of void. The former stated “Clay is moulded to make a vessel. But the utility of the vessel lies in the space where there is nothing. Thus taking advantage of what is, we recognize the utility of what is not” [1] and the latter: “There are smallest indivisible bodies from which everything else is composed, and that these move about in an infinite void space” [2]. This concept of void space is certainly one, if not the most powerful and enabling tool in our understanding, reasoning and development of chemistry. It has been manipulated, often intuitively or unconsciously, by generations of scholars ever since chemistry has existed. It is nowadays used at all scales: from the atomic nano-scale up to the industrial macro-scale.

While nature abhors a vacuum, technology loves it with numerous advances in radio, television, computers and many other life-changing equipments. The same holds true for chemistry in general and catalysis in particular. For the latter field, the concept of catalytically active site, first conceived by Taylor in 1925 [3], has been recently rationalized and developed to promote numerous catalytic reactions by Ertl and Thomas, who used adapted physical techniques to investigate the catalytically active sites of model solid catalysts [4a] and porous catalysts respectively [4b].



In the context of Thomas' book on the "Design and applications of single-site heterogeneous catalysts" [5], this contribution will highlight the use of voids and single sites and provide a few key examples selected from the field of homo- and heterogeneous catalysis and covering several orders of magnitude in terms of size, different states of matter (gaseous, liquid and solid), fundamental phenomena as well as industrial applications.

References

- [1] Lao Tze, Tao Te Ching, chapter 41.
- [2] Berryman, Sylvia, "Democritus", The Stanford Encyclopedia of Philosophy (Fall 2010 Ed.), Edward N. Zalta Ed., <<http://plato.stanford.edu/archives/fall2010/entries/democritus/>>.
- [3] H.S. Taylor, Proc. Royal Soc., 1925, 108A, 105.
- [4] Characterization of solid materials and heterogeneous catalysts - From structure to surface reactivity, M. Che and J.C. Védrine Eds, Wiley-VCH, 2012, volume 1, a) G. Ertl, pp. XLV-LIII, b) J.M. Thomas, pp. LIV-LXV.
- [5] J.M. Thomas, Design and applications of single-site heterogeneous catalysts - Contributions to green chemistry, clean technology and sustainability, Imperial College Press, 2012.

Tutti gli interessati sono invitati a partecipare.

Il Direttore del DSCF

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