

UDK 541.13

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## **ACTIVE PROTECTIVE MULTI-FUNCTIONAL COATINGS BASED ON "SMART" NANOCONTAINERS**

The destructive effect of environment and the corrosion induced degradation are the important problems which determine the service life of many metallic components. The application of organic coatings is the most common and cost effective method of improving protection and durability of metallic structures. However the degradation processes develop faster after disruption of the protective barrier. Therefore an active protection based on “self-healing” of defects in coatings is necessary to provide long-term effect.

The present paper overviews our recent progress in development of novel protective coatings with self-healing ability on the basis of nanocontainers that release entrapped corrosion inhibitor in response to presence of corrosive species. The new nanocontainers for organic and inorganic corrosion inhibitors were developed in this work employing nanocarriers including polyelectrolyte layer by layer assembled structures, mesoporous nanoparticles, halloysite nanotubes and different nanoclays. The combination of different nanocontainers in the same coating system was demonstrated to provide an important cooperative effect especially when active coatings for hybrid assemblies are considered.

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## **NEW SCIENTIFIC AND NANOTECHNOLOGICAL OPPORTUNITIES OF NANOMATERIALS IN THE FIELD OF ELECTROCHEMISTRY**

The design of new material architectures have emerged as an interesting aspect of nanotechnology for fabricating advanced functional materials. Recently, many progresses are devoted to develop innovative strate-

gies to prepare nanomaterials with desired properties. In fact, to obtain materials with the desired properties, chemical composition is not enough, and the morphological aspect has to be considered. Beyond material nanostructuring with uniform composition, design of hybrid nanocomposites is an alternative approach to create the synergy between different components, which will enhance the existing properties or induce new properties. Furthermore, the development of new and universal approaches to prepare materials with the desired properties is of great urgency and tremendous challenge in material science.

Research developed in my group is focused mainly on the design of nanomaterials with new architectures, and the preparation of nanostructured films with controlled properties for different applications. In this presentation, we will show how nanomaterials could be an efficient way to improve the performance of the electrode for different applications such as sensing, self-cleaning surface, photovoltaic etc. ... [1-3].

#### REFERENCES

1. Yanpeng X., Taleb A., Jegou P. Electrodeposition of cobalt films with an oriented fir tree like morphology with adjustable wetting properties using a self-assembled gold nanoparticle modified HOPG electrode // J. Mater. Chem. A. -2013. – V. 1. –P. 11580-.
2. Taleb A., Mesguich F., Yanpeng X. Colbeau-Justin C., Dubot P. Solar energy materials and solar cells // Solar Energy Materials and Solar Cells. – 2016. – V. 148. – P. 52-.
3. Taleb A., Yanpeng X., Dubot P. Self-organized gold nanoparticles modified HOPG as new electrode for electrochemical nanosensing application // Applied Surface Science. –2016. – V. 420. –P. 110-117.

УДК 544.6

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### **ЭЛЕКТРОХИМИЧЕСКИЕ ТЕХНОЛОГИИ ДЛЯ СОЗДАНИЯ НОВЫХ КОМПОЗИЦИОННЫХ МАТЕРИАЛОВ В СОЛЕВЫХ РАСПЛАВАХ**

Экстремальные условия эксплуатации изделий обуславливают применение дорогостоящих тугоплавких металлов и сплавов, обеспечивающих высокие рабочие характеристики. Одним из