# Project Proposal for 2011 DocMASE Candidates

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| Project Title | ***Chemistry and properties of noble metals based nanocomposites*** |
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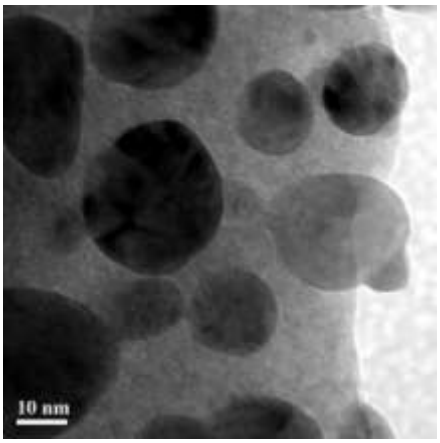
| Second Univ. and Advisor | **Saarland University** (Saarbrücken, GERMANY)<br>Dr. Flavio SOLDERA |
| Associated Partner(s) | Instituto de Ciencia de Materiales de Madrid (ICMM) (Madrid, Spain)<br>European Synchrotron Radiation Facility (ESRF) (Grenoble , France) |
| Project Description | Noble metal oxides offer new possibilities of engineered morphologies, electronic and optical properties as well as high catalytic rates [1, 2].<br>***This PhD thesis intends to study the thermal evolution of the physical and chemical properties of noble metal incorporated oxide thin films.*** The films will be deposited by physical vapor methods. The physical and chemical properties of the deposited films will be probed at the atomic scale by using a set of characterization methods including spectrophotometry, photoluminescence, resistivity measurements, high resolution transmission electron microscopy (HRTEM), atom probe and X-ray based methods (XANES and XRD). Particular attention will be paid to the properties resulting from the segregation of noble metal nanoparticles triggered by conventional annealing or by laser interference patterning.<br>  <br><br>Figure: segregation of noble metal nanoparticles in an oxide matrix. |
| References | [1] D.I. Zakharov, D. Horwat, J.L. Endrino, F. Capon, J.F. Pierson, Evolution of structural and physical properties upon annealing of sputter-deposited $Zr_{0.84}Y_{0.16}$-$O_2$ films incorporating copper and palladium nanoparticles, IOP Conference series: Materials Science and Engineering 5 (2009) 012022<br><br>[2] G. C. Bond, D.T. Thompson, Gold-Catalysed Oxidation of Carbon Monoxide, Gold Bulletin 33 (2000) 41-51 |
| Previous Publications | J.L. Endrino, D. Horwat, sheet with platinum bronze coating, synthesis method and applications, Patent<br><br>R. Catrin, D. Horwat, J.F. Pierson, S. Migot, Y. Hu, F. Mücklich, Nano-scale and surface precipitation of metallic particles in laser interference patterned noble metal-based thin films, Applied Surface Science (2010), In press |