



# A Soft Chemistry Approach To High Entropy Alloys Based Macro- and Mesoporous Particles

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High entropy alloys (HEAs) are composed of five or more homogeneously mixed elements in nearly equimolar ratios. HEAs have rapidly gained importance in the field of catalysis and electrocatalysis, due to their high chemical and thermal stability and to the virtually unlimited types of active sites accessible, stemming from the high configurational entropy.<sup>1</sup> In this oral communication, we present a low temperature approach for the synthesis of macro- and mesoporous HEA particles composed of Pd, Pt, Ir, Rh and Ru. This method is inspired by the aerosol templated sol-gel synthesis of porous oxides. By spray-drying a solution containing dissolved metal salts and latex beads, hybrid particles composed of latex beads embedded in an inorganic salts matrix are formed due evaporation induced self-assembly (EISA). Porous, fully reduced HEA-based particles are obtained by annealing the hybrid particles at temperatures as low as 350°C under inert atmosphere. The porous particles exhibit elevated specific surface area, ranging between 100 and 150 g m<sup>-3</sup>, the highest value reported so far for this kind of materials. High resolution STEM-EDX revealed that the porous structures are composed by small HEAs nanocrystals, while ToF-SIMS showed evidence of metal alloying at the atomic scale. The porous HEA-based particles showed a good catalytic activity towards the CO oxidation reaction, in contrast with non-porous control particles. *In situ* scanning transmission electron microscopy proved that the porous structure is stable up to 800°C. In conclusion, this work shows a versatile approach for the exploration of self-supported HEA-based porous materials, with important implications in catalysis and electrocatalysis.<sup>2</sup>

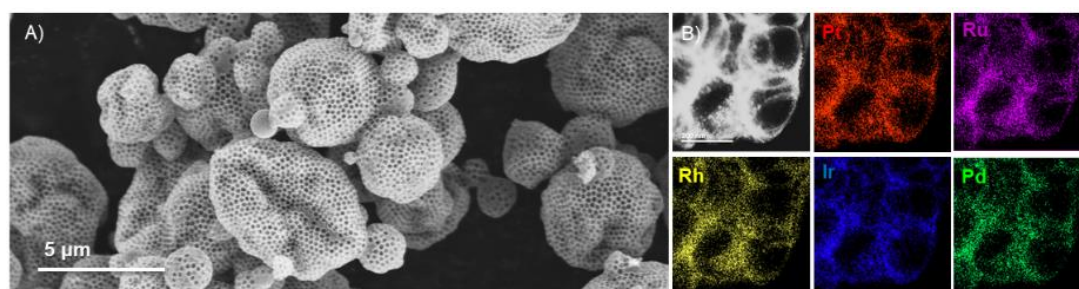


Fig. 1 : Porous HEAs particles. SEM (A) and STEM-EDX (B) characterization

1. Y. Xin, S. Li, Y. Qian, W. Zhu, H. Yuan, P. Jiang, R. Guo, L. Wang, *ACS Catal.* **10**, 11280–11306 (2020).
2. M. L. De Marco, W. Baaziz, S. Sharna, F. Devred, C. Poleunis, A. Chevillot-Biraud, S. Nowak, R. Haddad, M. Odziomek, C. Boissière, D. P. Debecker, O. Ersen, J. Peron, M. Faustini, *ACS Nano*, **16**, 15837–15849 (2022)