In the last fifteen years, the application of metal nanoparticles as catalysts in organic synthesis has received a renewed interest. Therefore, much attention is currently being paid to the synthesis of metal nanoparticles in order to achieve the control of their characteristics in terms of size, shape and surface chemistry. Besides this, the recyclability as well as the recovery from the reaction medium still remain the major drawbacks to widespread the use of nanoparticles in catalysis. To overcome these problems, the immobilization of metal nanoparticles on solid supports appears as a promising alternative. In that context, carbon materials offer several advantages as solid supports such as availability, relatively low cost, high mechanical strength, chemical stability, and a pore structure along with an attractive surface chemistry which allows easy modifications, such as its functionalization, to suit the nanoparticles immobilization needs. Among the transition metals Palladium and Ruthenium are widely employed as efficient catalysts in many reactions. Herein, the most recent advances, from recent papers and patents, in relation to the preparation of carbon-supported Pd or Ru nanoparticles systems as well as their application as catalysts in alcohol oxidation, cross-coupling or hydrogenation reactions, are reviewed.