The volume increased very much in the combustion. From the photographs shown in figure 4a and 4b, it can be seen clearly that the volume of synthesized sample expanded about 10 times larger than that of the corresponding gel. This volume expansion reveals the very low density and porous structure of the synthesized samples. Large amount of gas released in the combustion should be the reason of the formation of the porous structures. The morphology of the sample was characterized by SEM. Figure 5 shows a typical SEM image of the sample ignited at 600 °C. From this image, many pores can be observed with the diameter of 50–500 nm. This reveals that the produced sample is porous, and thus the measured density of the sample is as low as 0.002 g/cm³. This nano-porous structured metal has the advantage of the penetration of the gases, high thermal conductance and high electric conductance.

Fig.5 SEM image of the 600 °C ignited sample. Nano-porous structure can be observed.

Fig.6 Typical TEM image of the sample ignited at 600 °C. Nano-porous structure is formed through the connection of nanoparticles with the dimension of about 200 nm in width and 600 nm in length.