

Supplementary information

Experimental part.

Synthesis of liquid polyborazylene. Borazine is prepared by reaction of NaBH_4 with $(\text{NH}_4)_2\text{SO}_4$ in tetraglyme as already described in the literature [21]. 20 ml of pure borazine are placed in a pressure vessel under argon at 0°C to decrease monomer volatility. The autoclave is heated from 0°C to 45°C ($5^\circ\text{C}/\text{h}$) and then kept at the final temperature for 96 hours, the pressure reaching 5.5 Bar. After this period, the autoclave is cooled down to room temperature and degassed (carefully). At the end of the experiment, about 15 mL of a colorless liquid polyborazylene is obtained.

Sample preparation. Titanium (aluminium and copper) pieces (1×5 cm) of 99,9% purity (Neyco) are polished and treated at 300°C under vacuum for 2h prior using.

Dip-coating process. Due to the air sensitivity of the polymer, all the dip-coatings are carried out in a gloves box filled with argon. A series of three dips is performed for all the samples, each dip being followed by a classical heating at 100°C to occur the solidification of the dip-coated polymer.

Infrared annealing. Still in the gloves box, the preceramic coating deposited onto the metallic substrate is placed under an infrared lamp with a reflector MR16 (OSRAM, XENOPHOT 64635 HLX 15V, 150W) to achieve the polymer-to-ceramic conversion. A typical annealing occurs 1 hour, since a rapid lamp intensity increasing is performed. The final temperature (typically 1200°C) is measured by a specific thermocouple localized at the focus point of the IR lamp.