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Abstract
Two subjects are presented in this thesis. One is inorganic hydrothermal method to prepare metallic oxide nanostructures, and the other sol-gel method associated with dip coating technique to prepare low emissivity coatings. Two most important parameters of low emissivity coatings are emissivity and reflectance respectively. Their working principles and measuring methods are discussed thoroughly in this thesis.
In the first subject, different ingredients and concentrations are used to hydrothermally synthesize MgO, Al(OH)3, VOx, TiO2, ZnO and WO3 nanostructures in a Teflon-lined autoclave. The synthesizing temperature and time are 100℃~150℃ and more than 8 days, respectively. Some final products can be separated out with the aid of acids. All products are analyzed by TEM, HRTEM, EDX, FTIR and TGA. The inorganic hydrothermal method avoiding the application of organic solutions can keep the contamination out of nanostructures during hydrothermal synthesizing, and this inorganic hydrothermal method is simply equipped and low cost.
In the second subject, the infrared camouflage technology and its corresponding measurement principles of emissivity and reflectance are discussed. Moreover, sol-gel method is used to prepare low emissivity coatings. The applied raw materials include manganese acetate, cupric chloride, cobalt chloride and nickel chloride. The reaction takes place in a mixed organic solution at 60℃, so as to form a sol-gel solution. Then, dip coating technology is used to coat sol-gel films on stainless steel substrates. Three low emissivity coatings possessing emissivity difference reaching or greater than 0.13 ($\varepsilon \geqq 0.13$) and reflectance ranging between 0.1 and 0.26 are prepared successfully. Therefore, three different emissivity coatings can camouflage and deform targets under infrared detection.
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