

## Differential Thermal Analysis for Laser Irradiated Composite $\text{TiO}_2/\text{C}$

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Problem of dehydration of functional nanomaterials for LPS and energy storage devices is quite relevant in view of the fact that water significantly reduces their specific characteristics. We studied the effect of thermal performance and laser irradiation on the change of water content in the composite  $(\text{TiO}_2)_x/\text{C}_{1-x}$ , де  $x = 0,1; 0,2; 0,3$  by the method of differential thermal analysis

Fig. 1 presents the results showed that irradiated samples during the heating are losing water much greater than unirradiated, that is crucial for their use in LPS. It was found that the mass loss of composite  $\text{TiO}_2/\text{C}$  (Fig. 1, *a*) most significantly depends on the percentage of  $\text{TiO}_2$  in the composite and their laser treatment.

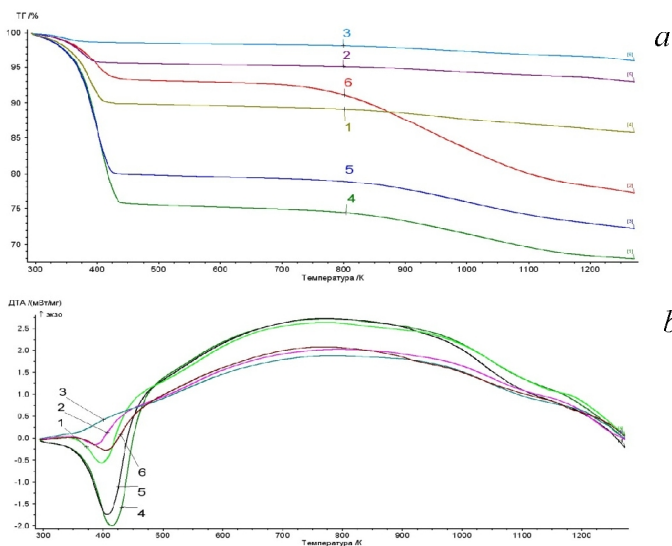


Fig. 1. TG curves (*a*) and DTA (*b*) for composite  $\text{TiO}_2/\text{C}$ , where the content of  $\text{TiO}_2$  is 1 – 10%; 2 – 20 %; 3 – 30 % (unirradiated samples); 4 – 10%, 5 – 20 %; 6 – 30 % (laser irradiated samples)

In the first case, the sample mass loss increases with decreasing of  $\text{TiO}_2$  amount in the composite, which can be explained by the fact that the content of adsorbed water in nanoporous carbon is much higher than in the nanoscale  $\text{TiO}_2$ , since the carbon surface area is ten times larger than the titanium dioxide surface area.

Also, adsorption ability and morphology of these surfaces should be taken into account since they also contribute to greater water retention of carbon surface than the  $\text{TiO}_2$  surface. However, laser irradiation reduces the energy of water molecules interaction with the carbon and titanium dioxide surfaces. DTA curves (Fig. 1, *b*) obtained for these samples, where in the temperature range 350-450 K endothermic effects (responsible for water desorption processes) occur, prove the mentioned above.