# LASER-INDUCED APPROACH TO NANOSCOPIC TITANIUM OXYCARBIDES

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**Abstract**

IR laser-induced reactive ablation of frozen titanium ethoxide target was studied. The major effort is to discern among $Ti_xO_2$-x, $Ti_xO_1$-x and $TiC_xO_y$ species. The method involves the laser ablation of titanium ethoxide at -140 °C in the gaseous methane ($2^{-15}$ Pa). This process leads to reactions of the ablative species with hydrocarbon in the gaseous phase.During the ablation of the frozen target excited species interact with methane molecules. The carbidation leads to the formation of a smooth thin film. The thickness of prepared film and its composition depend on the pressure of gaseous methane and number of IR pulses. This reactive IR ablation proceeds as a carbidation process affording nanostructured films with good adhesion to various substrates (glass, metals, KBr) and hydrophility depending on the carbon content in prepared film. Particles are also stabilized by carbon layer preventing their surface oxidation in the atmosphere. The described results are important in the general context for the synthesis of reactive particles in the gas phase.The final products are characterized by spectroscopic, microscopic and diffraction techniques: SEM/EDX, TEM, electron diffraction, FTIR, Raman spectroscopy, XPS and XRD.

**Keywords:** IR laser, reactive ablation, frozen titanium ethoxide, titanium oxycarbides, methane, nanostructured films

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