

# Photocatalytic activity of C, N, F-doped TiO<sub>2</sub> nanostructures in doxycycline degradation

Romanovska N.I.<sup>1</sup>, Manoryk P.A.<sup>1</sup>, Grebennikov V.M.<sup>1</sup>,

Shulzhenko O.V.<sup>1</sup>, Selyshchev O.V.<sup>2</sup>, Zahn D.R.T.<sup>2</sup>



<sup>1</sup>Physico-inorganic chemistry Department, L.V. Pysarzhevskii Institute of Physical Chemistry of the NAS of Ukraine. Prospect Nauki, 31, Kyiv-03039, Ukraine.

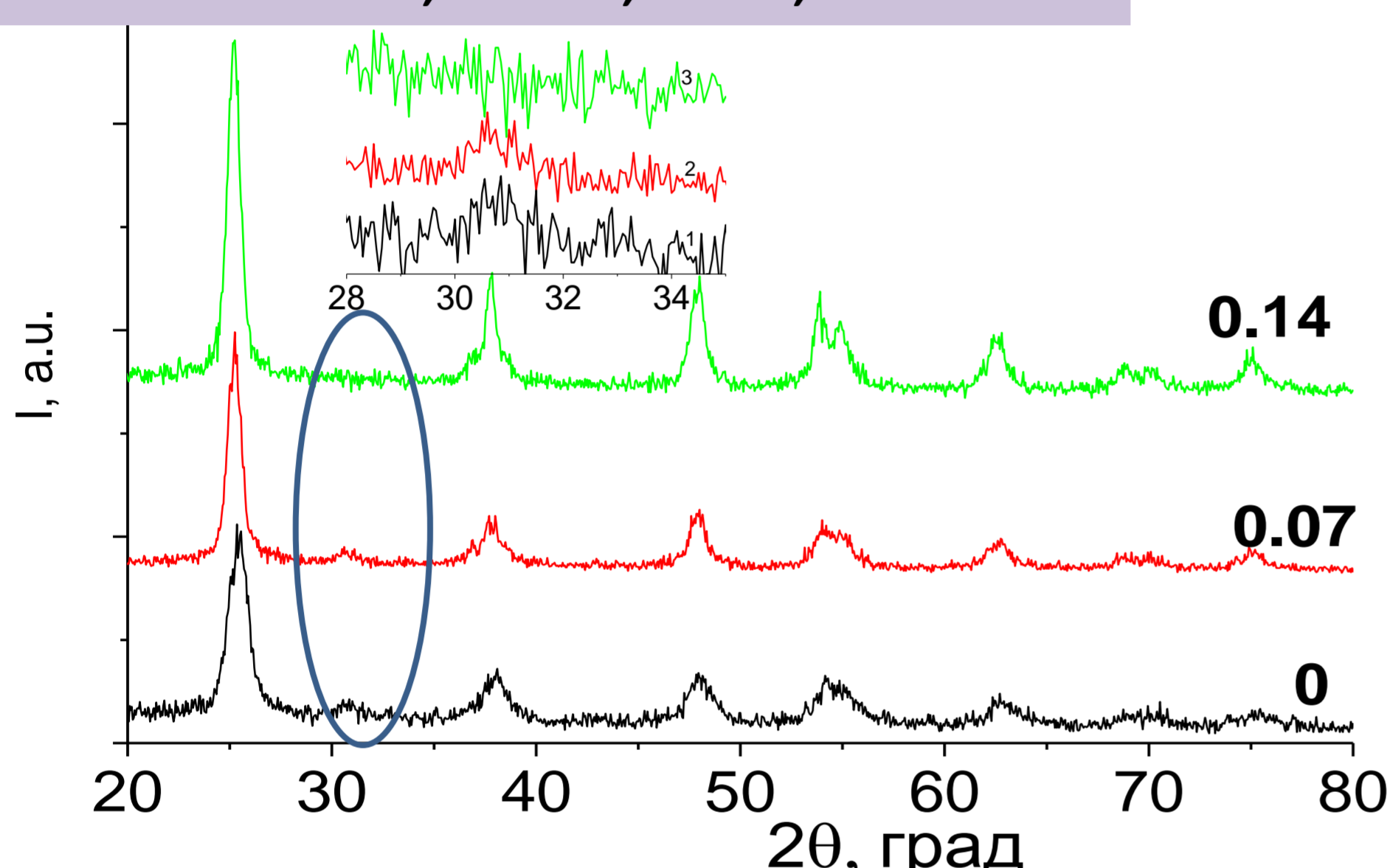
<sup>2</sup>Semiconductor Physics, Chemnitz University of Technology, D-09127 Chemnitz, Germany

The aim of this work was the investigation of NH<sub>4</sub>F/Ti(BuO)<sub>4</sub>=X ratios in the reaction mixtures influence on the phase composition, morphology, texture and photocatalytic activity of the samples obtained in the degradation of doxycycline (DC) under UV- and visible light irradiation.

**Objects** C,N,F-doped TiO<sub>2</sub> nanostructures, obtained by sol-gel method with NH<sub>4</sub>F as fluorine source with followed hydrothermal treatment and calcination

**Methods:** XRD, TEM, XPS, UV-Vis

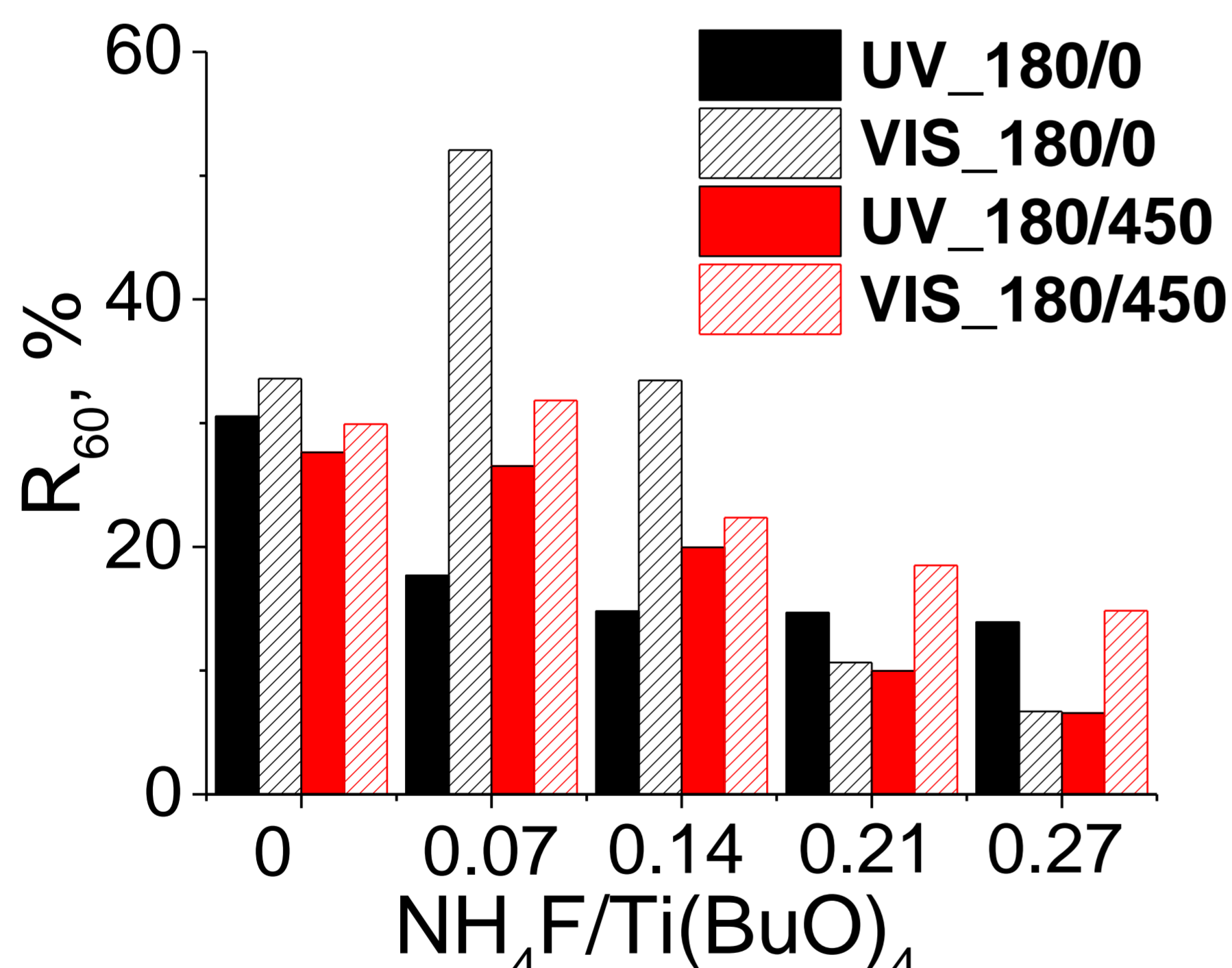
## Phase composition and crystallite size



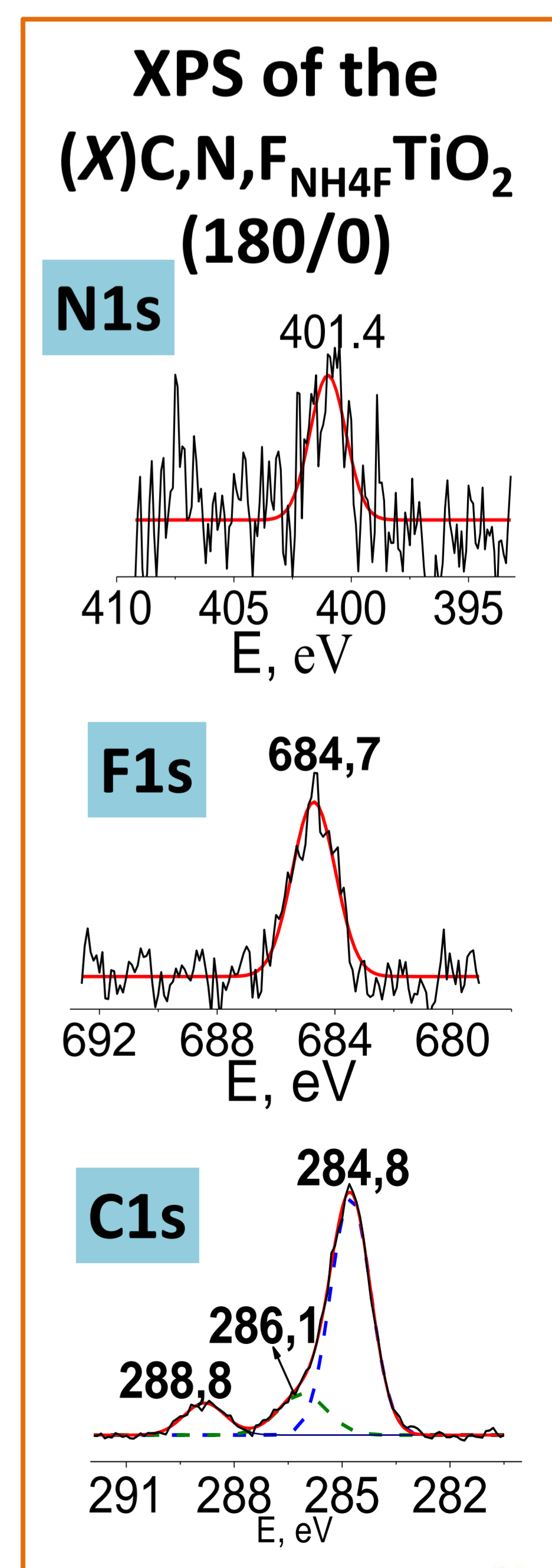
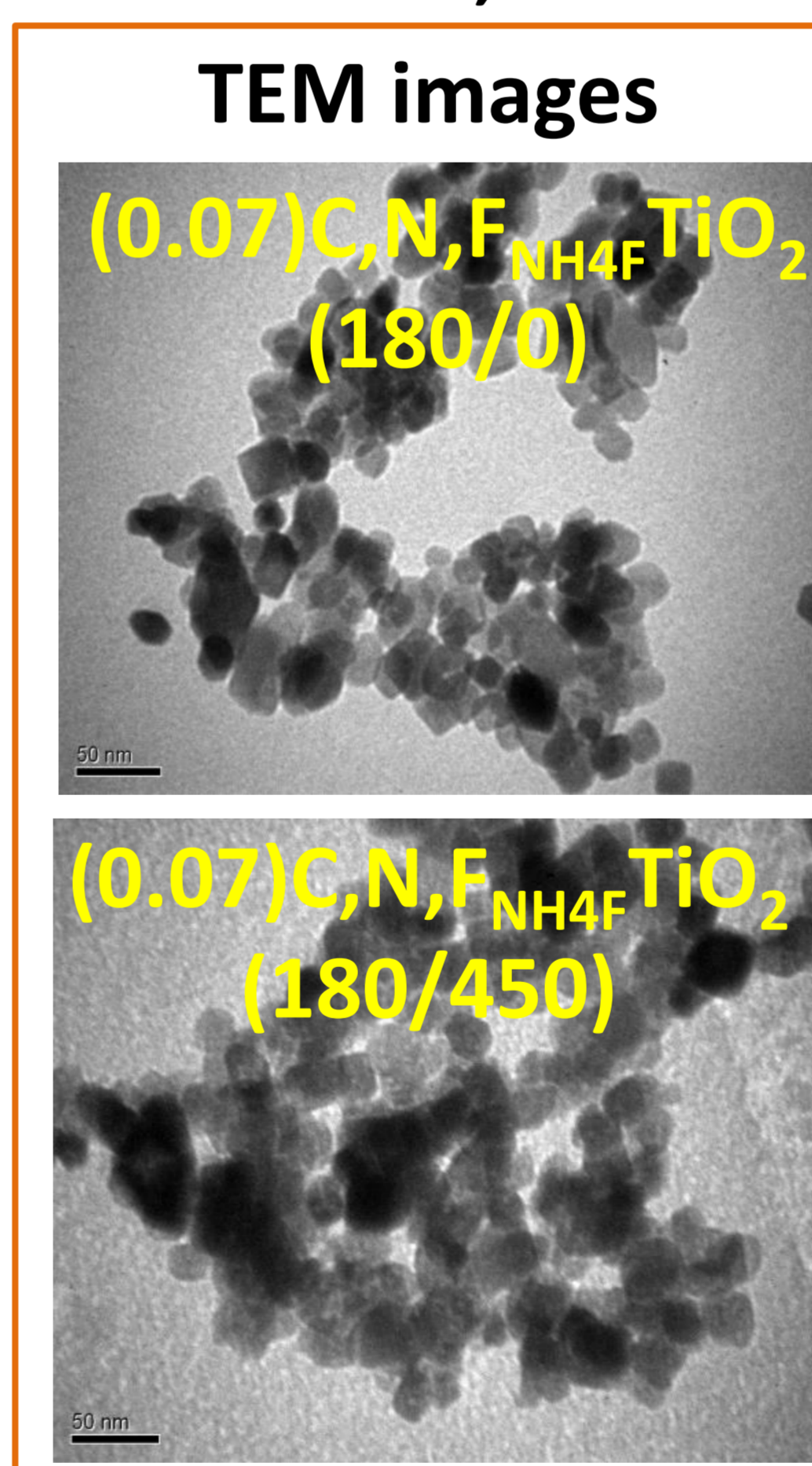
XRD of the (X)C,N,F<sub>NH4F</sub>TiO<sub>2</sub>(180/0)

X=NH <sub>4</sub> F/ Ti(BuO) <sub>4</sub>	A, %		B, %		d, nm	
	0	450	0	450	0	450
0	65	80	15	15	8	10
0.07	52	90	10	10	12	13
0.14	50	95			12	14
0.21	57	98			16	18
0.27	54	95			20	18

A – anatase; B - brookite



Photocatalytic activity of the (X)C,N,F<sub>NH4F</sub>TiO<sub>2</sub> (T<sub>HTO</sub>/T<sub>c</sub>) in doxycycline photodegradation



As the result, C,N,F-TiO<sub>2</sub> nanostructures were synthesized by the hydrothermal sol-gel method, using NH<sub>4</sub>F as fluorine source. It was shown, that phase composition, texture and morphology strongly depends on X. These materials demonstrate visible light photocatalytic activity in doxycycline photodegradation.

