

**Supervisor's opinion on PhD thesis of Mr. Bandu Madhukar Kale M.Sc.**

**Date: 30.03.2017**

**Thesis title: Multifunctional cotton fabric with nano TiO<sub>2</sub> loaded cellulose**

The PhD thesis titled "Multifunctional cotton fabric with nano TiO<sub>2</sub> loaded cellulose" is quite comprehensive and fulfills the objectives outlined in his thesis. The candidate has done all his work quite systematically, on required scientific level, with specific objectives. Discussion of the results is comprehensive and logical with citations of previous work where necessary. The quality of figures and tables is good and understandable. The language level of the thesis is good and meets the PhD standard.

His publication activities are in very good level. During his research work in TUL on the PhD theme, he has published 5 papers in impact factor journals, 1 book chapter and 5 paper presented at international conferences.

He has introduced new route to make cotton fabric self-cleaning, antibacterial, antifungal and permanently stiff by coating cellulose-TiO<sub>2</sub> nanoparticles on the surface. From results, it is concluded that functional properties are durable against repeated washing, tensile strength increases after cellulose coating and comfort properties are hardly affected. He has developed novel method from X-ray diffraction patterns to quantify amount of cellulose I, II and amorphous fractions. The conclusions of the thesis are interesting and novel. I therefore recommend the thesis for final defense.

**Liberec 30/03/2017**

  
**Prof. Ing. Jiří Militký, CSc. EURING**  
**Supervisor**