



## *System and method for on-line monitoring of beer primary fermentation based on UV-VIS-SWNIR spectroscopy*

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### **DESCRIPTION OF TOPIC:**

**Aim:** This work aims at demonstrating a new system and method for on-line monitoring of beer primary fermentation.

**Methods:** The system is based on UV-VIS-SWNIR spectroscopy. It includes: 1) a fiber-optic probe and a universal probe adaptor specially designed for industrial fermenters; 2) a mini-spectrometer; 3) software specially developed for multivariate calculation of fermentation parameters; 4) graphical interface.

**Results:** Calibrations were developed for biomass (CFU/mL), Brix, pH, ethanol (%), color, apparent and real extract (%), RDF (%), ADF (%), n-propanol (mg/L), iso-butanol (mg/L), total amyl alcohols (mg/l), ethyl acetate (mg/L), amyl acetate (mg/L), acetaldehyde (mg/L), dimethyl-sulfate (mg/L); diacetyl (mg/L). Correlation factors were always above 0.92. On-line calculation of these parameters was performed.

**Conclusions:** The system is able to perform real-time and predictive control and diagnostics of beer fermentations, allowing preventive or corrective measures.

### ***Pedro Rodrigues***



Pedro Rodrigues was born at Oporto, in 1973. In 1996 took the degree in Biochemistry and in 2003 a PhD. in Chemistry, both in Oporto University. From 1996 to 2004, works in research within Oporto University, and in 2001 at BRI, where builds up his passion for beer. Since 2004 works for Unicer, passing through different positions in Quality & Innovation Dept. as manager, first in the central lab, in central technical services and finally in industrial quality. In 2011 was appointed as production director.