

LexMar Global Innovation Lab Presents Poster with first results of a collaboration with University of Massachusetts at PANIC

Haverhill, MA— (November 26, 2020)— In 2019, LexMar Global Inc. announced a partnership with University of Massachusetts Amherst (UMA). The first project of this collaboration was an NMR Relaxometry study performed in collaboration with UMA's Polymer Science & Engineering (PSE) department. The results were presented at this year's PANIC (Practical Applications of NMR in Industry Conference) which was held virtually from Oct 19th to 23rd. There was a live Q&A session which was well attended featuring several technical questions that were answered.

The conference was initially planned for April but moved to October because of the COVID-19 pandemic and ultimately held virtually. The complete technical program of PANIC 2020 was accessible until November 25th, 2020. The poster is titled "Study Of Semi-crystalline Polymer Ageing by NMR Relaxometry" and is now available on LexMar Global's webpage in high-resolution or, alternatively, with audio commentary (<https://lexmarglobal.com/the-innovation-lab>).

Poster abstract: NMR relaxometry is an analytical tool frequently used for process and quality control in polyolefin plants. One application of this method is the prediction of xylene soluble (XS) fractions in polypropylene. Due to its simplicity, shorter length of experiment and no use of hazardous chemicals compared to standard wet chemistry methods, time-domain NMR is an advantageous method for XS fraction determination. It is well known that semi-crystalline polymers exhibit morphology changes with age, often becoming more crystalline over time. The study is aimed at quantifying these morphology changes with age in order to understand how they impact NMR relaxometry measurements. Sixteen random copolymer (RACO) polypropylene powder samples were heat treated (annealed) to erase prior age-induced crystallization. The samples were cooled, then analyzed at five different age intervals between several minutes and one month. Free Induction Decay signals were collected on a LexMar Global MagStation II laboratory NMR analyzer. Each of the FID's were fit with a regression model to quantify the crystalline, amorphous, and interphase domains. A Gaussian-Exponential-Exponential function was shown to have the most accurate fit of any of the investigated models. It was found that both phase fractions and relaxation rates changed with sample age for all investigated samples. In addition, a predictive model of XS was generated using a transformation of the extracted fit parameters of least aged samples. This model was then applied to the other samples to quantify the impact sample age would have on time-domain NMR XS measurement accuracy.

About University of Massachusetts Amherst

As one of the largest academic centers for polymer research in the world, University of Massachusetts Amherst seeks to expand the useful application of polymers to human needs, creating an institution that is committed to excellence. The academic focus of UMA's Polymer Science & Engineering (PSE) department spans all aspects of the evolving polymer field, from synthesis to engineering and physics. Cross-discipline research is integral to our program and most often involves departments such as Physics, Chemistry, Biology, and Chemical Engineering. PSE students and faculty participate extensively in collaborative research programs with other universities and at national laboratories. UMA's Polymer Science & Engineering website can be accessed at www.pse.umass.edu.

About LexMar Global

LexMar Global, a globally operating manufacturer of scientific instrumentation, provides industrial Nuclear Magnetic Resonance (NMR) and electrostatic measuring equipment to quality laboratories and manufacturing plants. These techniques have been proven effective in several industries including petrochemicals, specifically polyolefins, and minerals. The world's leading polymer manufacturers utilize our products every day to improve process efficiency and increase profits. LexMar Global's website can be accessed at www.lexmarglobal.com.