**Editorial** ..... 211

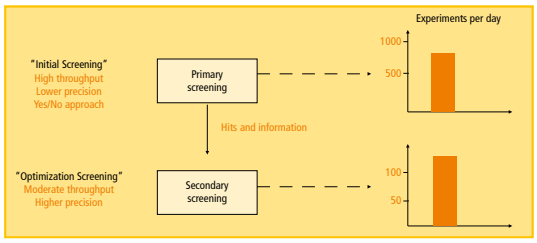
**RFP News** ..... 214

**The sound of e-mobility? – Alternative fuel cars will change the nature of automotive acoustic packages** ..... 226

D. RESSNIG, V. THAKUR, C. LI PI SHAN

**New Nordel EPDM developments for automotive sealing applications** ..... 230

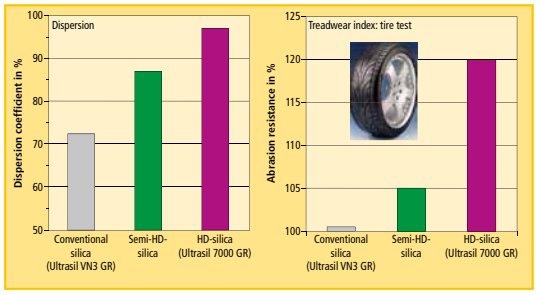
Herein we investigate the molecular structures of EPDMs derived from different catalyst technologies and their effect on performance with automotive weather sealing profile extrusion as target application. Dow's recent development of advanced molecular catalysts (AMC) enables new molecular design capabilities to surpass the performance of the previous generation of single site catalyst (SSC) EPDMs. New capabilities entail higher molecular weight, broader molecular weight distribution, more homogeneous long chain branching and higher diene content. All these polymer attributes were thought to be associated only with ZN catalyzed EPDMs till now, however, Nordel 6565 XFC (XFC: extra fast cure) is characterized by these attributes and has been specifically designed for fast dense extrusion processes. Its molecular geometry anticipates high performance during processing (green strength, curing speed). As a final part the Nordel 6565 XFC EPDM is compared to conventional, state-of-the art SSC and Ziegler-Natta (ZN) derived EPDMs.




A. BLUME, F. THIBAULT-STARZYK

**Deciphering the silica/silane reaction mechanism for the development of a new generation of low rolling resistance tires – Part 2 – Transfer of results from model examinations into practice** ..... 236

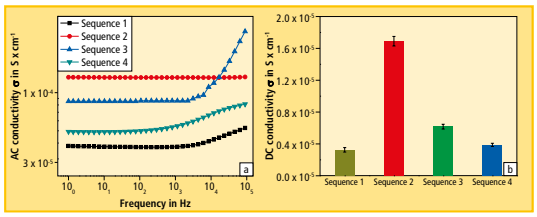
By use of suitable organic silanes and controlled mixing conditions, silica/silane systems have proven to be well suited for tire tread formulations with reduced rolling resistance. The bifunctional organosilane is able to react with the silica surface as well as with the polymer. However, silica compounds still present considerable difficulties in processing. The kneader is not only a mixing aggregate but has to fulfill the role of a chemical reactor. It is known from former studies, that the reaction between the silica and the silane is complex. It is up to now not sufficiently understood. Therefore, a better understanding would help many tire producers to control the mixing process more efficiently. Part 1 has shown how Operando IR spectroscopy can be employed to decipher the reaction mechanism. In part 2 the method is used to investigate the reaction of several silica samples with different silanol group densities. Molecular modelling has been used in order to understand the sterical aspects of the reaction. The gained knowledge was used to develop two new silica/silane systems for passenger car tire treads. Their properties in tire treads have been investigated.




S. MONDAL, D. KHASTGIR

**Enhancing the electrical conductivity of incompatible polymer blends** ..... 242

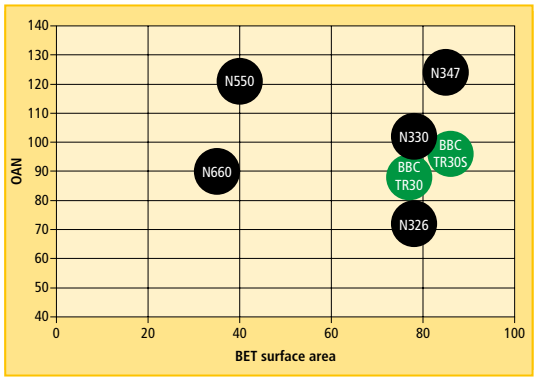
A novel two-step mixing process was investigated, in which carbon black fillers are added to a nitrile butadiene rubber/ethylene propylene diene monomer mixture in different sequences.




C. TWIGG

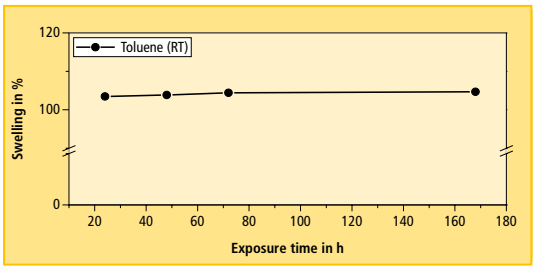
**Innovating the carbon black industry with upcycled tires** ..... 246

Nowadays waste tires are either dumped or burned. The carbon blacks contained in these tires are thus not recycled and just wasted. Through an innovative pyrolysis process, the company Black Bear Carbon has managed to recover high-quality carbon black from waste tires. These "green" carbon blacks have outstanding properties and can completely replace ASTM standard carbon blacks. Thus, they are a sustainable alternative to the products normally used in polymers, plastics and rubber.



W. BALASOORIYA, B. SCHRITTESSER, G. PINTER, T. SCHWARZ
**Influence of HNBR ageing in oilfield applications ..... 250**

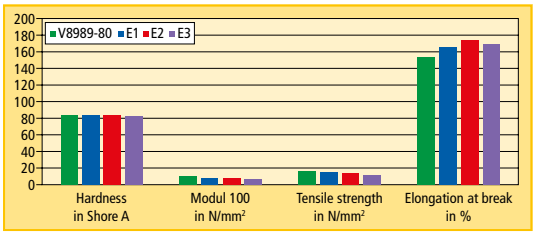
Elastomers are a popular class of materials in oilfield applications as down-hole packers, seals, gaskets etc., due to their soft, nearly elastic and nearly incompressible nature. However, the performance of those properties depends mainly on three factors in operation: the viscoelastic effects, working temperature and the surrounding media. Elevated application temperatures may lead to chemical degradations in the material, while various surrounding media may result in the absorption of liquid by the elastomer (swelling), extraction of soluble constituents from the elastomer or chemical reactions with the elastomeric material. Therefore, in the present work, the ageing behaviour (thermal and under the influence of swelling media) of hydrogenated acrylonitrile butadiene rubber (HNBR) in different conditions was characterised. Additionally, the Flory-Rehner theory for swelling, based on equilibrium swelling experiments was derived identifying the crosslink density changes in thermo-oxidative ageing. The results indicated that the thermal ageing process deteriorated the material leading to clearly decreasing tensile stress and elongation at break as well as damping properties. Additionally, the rigidity and the glass transition temperature of the material rises. In equilibrium swelling state, the mechanical properties were significantly reduced; however, they were fully restored in de-swollen state. The thermally aged samples demonstrated relatively low swelling behaviour and less mechanical property degradations compared to the virgin material. Based on the swelling amounts, the modified Flory-Rehner equation derives a relatively high crosslink density for thermo-oxidative aged samples compared to the virgin state, confirming the observed mechanical test results.




**Europe Rubber Processing Education Week 2017 preview ..... 258**

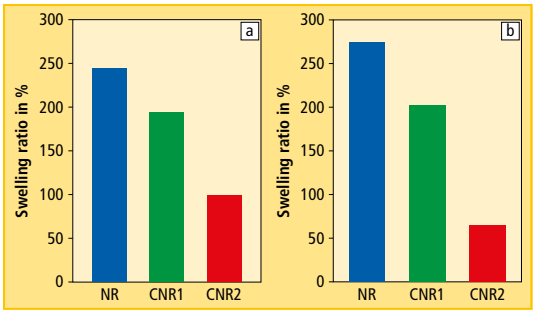
H.-C. ROST
**Biofuel compatibility of sealing materials at low temperatures ..... 260**

The combination of very good biofuel compatibility with excellent low-temperature properties is of major importance to the automotive industry. Changes in regulatory boundary conditions and tapping of new markets have increasingly been initiating new developments in this field. Parker has developed FKM compounds with TR10 values of -30 °C, -35 °C, -40 °C and -45 °C whose relative changes in physical properties following storage in FAM B, E85 and KGS (VW first fill fuel) are comparable. Furthermore, the performance of these compounds with respect to their sealing ability at very low temperatures was investigated in compression set tests at -25 °C down to -50 °C.




P. PAOPRASERT, T. CHANROJ
**Chlorohydrination of natural rubber latex using sodium hypochlorite for fuel resistant materials ..... 264**

Natural rubber is hydrophobic and unsuited for containers, hoses, and sealings or any other application that requires contact with hydrocarbon compounds. Herein, we report a simple method to increase the hydrophilicity of natural rubber. In this work, a chlorohydrination reaction of natural rubber latex using sodium hypochlorite is described. It was found that only chlorohydrinated natural rubber was obtained and side products were unnoticeable. The effects of sodium hypochlorite concentration, hydrochloric acid concentration, surfactant concentration, and reaction time on chlorohydrin content in natural rubber were investigated. The swelling resistance of chlorohydrinated natural rubber with 11 % chlorohydrin content in diesel and gasohol fuels was improved nearly threefold and fourfold, respectively, compared to that of the unmodified natural rubber. The thermal and mechanical properties of the chlorohydrinated natural rubber were characterized and found to be similar to those of pristine natural rubber, thereby indicating that the chlorohydrinated natural rubber can be an excellent substitute for natural rubber. This method has merits such as low cost of raw materials, easier and "greener" production processes than traditional methods, and scaling-up possibilities for the fabrication of chlorohydrinated natural rubber for a variety of applications.




**Horizontal bandknife splitting machine for cellular rubber and polyethylene ..... 270**

**Phosphorus version of natural rubber ..... 274**

**Imaging technique for quantifying the haze of materials ..... 274**

**People in the news ..... 276**

**Book reviews ..... 279**

**Suppliers list ..... 280**

**Publication information & contacts ..... 282**