MEDIA RELEASE

October 2018

Robert V Neher Award winner announced

At a special award ceremony held at the ALUMINIUM 2018 exhibition in Düsseldorf, the first ever winner of the Robert V Neher Award, a global academic competition for foil research and development, was announced. Hiroyuki Nishikawa and Yoshiki Hashizume were presented with a cheque for €10,000 for the award-winning work: *Development of super water-repellent material TOYAL LOTUS®*.

The winning submission detailed the development of a novel aluminium foil lidding material for yogurt packs that eliminates packed products sticking to the inner side of the lid. TOYAL Lotus® uses biomimetic coatings with a water repelling surface structure, which imitates the so-called 'lotus effect' and offers adequate heat-sealable properties. The material meets official safety guidelines and can be disposed of without any adherence of food residues.

Speaking after the presentation, Hiroyuki Nishikawa and Yoshiki Hashizume expressed their delight at winning the award: "The 'lotus effect' has been discovered and described elsewhere, but its application to improve the performance of sealable foil lids for food products is new. I am honoured that this scientific work had been acknowledged in this outstanding way."

The Robert V Neher Award is an academic competition involving aluminium foil and closures. It seeks out and rewards the very best innovative packaging and technical applications. Launched in 2017 by the Global Aluminium Foil Roller Initiative (GLAFRI), the award, named in honour of the inventor of the aluminium foil rolling process, invited submissions from students and academia from the packaging and food sectors and technical universities, worldwide.

Six entries from around the globe were submitted and assessed by a jury of five senior industry experts with academic and/or specific industrial backgrounds. Prof. Dr.-Ing. Jürgen Hirsch, head of the jury, commented: "The quality and diversity of entries was exceptional. We give our full respect to all works submitted and expect they all will play a role in the further development of foil production, processing, and innovative applications."

GLAFRI president Göksal Güngör praised the winner and explained GLAFRI's commitment to furthering the competition: "It is important to identify and reward the talents of future influencers and innovators, not only within our industry, but in academia as well. We hope this competition stimulates and encourages further research and development in this important area for foil producers, users and society in general."

Further information:

Stefan Glimm, Director General

The Global Aluminium Foil Roller Initiative (GLAFRI) is the global association coordinating actions on sustainability in order to support foil market growth and promote innovative development. GLAFRI members are foil rollers and suppliers and represent about 50% of the global foil production.

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Jury Statement on Robert V Neher Award

Final choices between six scientific papers on aluminium foil

In 2017 the Global Aluminium Foil Roller Initiative (GLAFRI) announced the inauguration of The Robert V Neher Award, an academic competition involving aluminium foil and closures designed to seek out and reward the very best in innovative packaging and technical applications. The award, which is named after the inventor of the aluminium foil rolling process, invited submissions from students and academia from the packaging and food sectors and technical universities worldwide. Six entries from around the globe were submitted by the end of May and were assessed by a jury of five senior individuals with academic and/or specific industrial backgrounds*. GLAFRI president Göksal Güngör and Prof. Dr.-Ing. Jürgen Hirsch, head of the jury, announced the Award winner at a ceremony on 9 October at the ALUMINIUM 2018 trade fair in Düsseldorf. A cheque for 10,000 euros was presented to the representatives of the award-winning work.

In its common statement the jury said: “It is the objective of this new academic global award to show innovation potential in the application of aluminium foil and to promote the ecological and economical value of foil products and applications, and direct and support the R&D society in their efforts for improved foil processes and applications to the benefit of all.

“In this first Robert V Neher Award initiative we collected six excellent pieces of work worldwide, which were all showing the innovation capabilities. The contributions describe new investigations (*Near Surface Microstructures in Twin Roll Casting,* which can help to improve Al-Fe-Mn-Si foil material), improved production processes (*Ultrasonic degassing* to remove critical hydrogen dissolved in molten aluminium in order to improve final product properties) and products (*High quality 3004 aluminium alloy tableware foil produced by Hazelett continuous casting process*, including an new aluminium melt processing technology) and innovative foil applications.”

The winner

The jury continued: “The winner is a novel foil surface that eliminates sticking of the packed product. This biomimetic coating has a water repelling surface structure imitating the called Lotus Effect (“TOYAL LOTUS®”) including adequate heat-sealable properties that helps to dispose the foil (e.g. as lids) without adherent food rests. The Lotus Effect has been discovered and described elsewhere, but its application to improve sealant foil lids is new and an interesting method with some potential for ecological and economical success.

“The runner up is an interesting innovation to improve the performance of foil for fire and explosion protection in transport, with some potential for ecological and economical success.

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The other is a method to convert dirty aluminium foil (Al foil) into mesoporous alumina that is used as e.g. a biofuel catalyst, which helps to avoid aluminium foil packaging to be wasted.

“The Jury had a difficult task to make the right selection, so we had established an anonymous evaluation process where we rated the technical and scientific relevance, the ecological and economic value and – with a higher value – the specific foil aspects and innovation potential of the proposal. All proposals achieved good ratings and a final selection was made according to criteria published.

“We give our full respect to all proposals and expect they all will play a role in the further development of foil production, processing and innovative applications. We hope this encourages further activities in this area important for foil producers, users, and the society,” the jury concluded.

Further information:

Stefan Glimm, Director General

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** The Award jury are:*

Prof. Dr.-Ing. Jürgen Hirsch (senior scientist at Hydro Aluminium GmbH’s R&D Centre); Prof. Tatsuo Sato (Professor Emeritus at Tokyo Institute of Technology); Prof. Marcelo Gonçalves (Escola Superior de Engenharia e Gestão, ESEG, Brazil); Paul D. Koning (Instructor at the School of Packaging of Michigan State University, USA) and Prof. Wang Zhutang (member of the expert committee of the China Nonferrous Metals Fabrication Industry Association and chief editor of the Aluminum Alloy and Processing Handbook in China).

Below is a summary of the six papers submitted:

Novel aging-strengthened fire-retardant & explosion-proof aluminium foil nets
by Jianguo Li, Liyuan Su (School of Materials Science and Engineering, Beijing, China)

The authors have developed and are promoting a novel aging-strengthened and corrosion-resistant foil and its processing for application in optimized fire-retardant and explosion-proof lightweight aluminium foil nets that meet safety requirements, such as those for airplanes or the transport of explosives. The main aspect is the control of corrosion by fuel oil, which reacts with the alloying elements Mn and Cu in the 3003 foil, thereby affecting the explosion-proof properties of the foil nets. To achieve this, a 6xxx aluminium foil was processed on industrial production lines with inline solution quenching and offline aging. The product is expected to have significant economic and social benefits.

Microstructure evolution in the near-surface region

by Junjie Wang, Ph.D, University of Manchester, Manchester, UK

a) Microstructure evolution in the near-surface region during homogenization of a twin-roll cast AlFeMnSi alloy.

b) Evolution of near-surface microstructures and their influence on forming behaviour of 8xxx aluminium alloys

The author investigated how during twin roll casting (TRC) the near-surface microstructures (NSM) exert a significant influence on final-gauge foil products (semi-rigid container stock). The NSM layer incorporates non-metallic constituents that consist of varying levels of oxide and rolling lubricant residues, which render the NSM layers highly friable and subject to disruption during forming (or other tribological processes). They are the source of foil-blackening / smut and are related to poor adhesion (lacquers and sealants) and corrosion resistance of foil, which explains various product quality / performance problems, including issues of recycled material and other key flat-rolled products, such as auto and canning products.

Development of super water-repellent material Toyal Lotus®

by Hiroyuki Nishikawa and Yoshiki Hashizume (Tottori University, Tottori, Japan)

This submission covers the development of a novel material for lids for yogurt packs that eliminates sticking of the packed product. TOYAL Lotus® uses biomimetic coatings with a water repelling surface structure, which imitate the so-called 'lotus effect' and offer adequate heat-sealable properties. The product meets official safety guidelines. The packages (lids) can be disposed of without any adherent food residues.

Turning dirty aluminium tinfoil into a biofuel catalyst and other useful products

by Ahmed Ibrahim Osman, (Queen´s University, Belfast, UK)

In this work, the author claims to have discovered a way to convert dirty aluminium foil into a biofuel catalyst and other useful products. It avoids aluminium foil packaging being wasted, landfilled or incinerated by transforming it using a novel, eco-friendly synthesis into a mesoporous alumina catalyst with better properties than commercial alumina. The mesoporous alumina can be used as an ultra-pure and highly active alumina powder catalyst in biofuel production, such as dimethyl ether, or as a catalyst support, such as in a variety of reactions like combustion, reforming, etc. Possible applications include the residential and automotive sectors, with costs that are less than half those for commercial alumina catalysts.

Ultrasonic treatment for casting aluminium alloys

by Kedar N Bhojak, Ph.D, (Gandhinagar Institute of Technology, Moti Bhoyan, Gujarat, India)

As an alternative to vacuum or rotary degassing, an ultrasonic degassing method is presented that allows the hydrogen dissolved in molten aluminium to be removed and thus avoid the formation of critical porosities upon solidification. Moreover, it helps produce fine and equiaxial grains and improves final product properties. Experiments conducted to compare the strengths of cast aluminium alloys samples showed that ultrasonic degassing could be a potential alternative to rotary degassing. However, the experiments were conducted with an aluminium alloy flow rate of 2,000 kg per hour.

Study on the production of high quality 3004 aluminium alloy tableware foil using the Hazelett continuous casting and rolling process

by Yongqiang Dai (Henan University Science & Technology, China)

3004 alloy (can stock) has good plastic formability and high yield strength. The Hazelett continuous casting process is used as a low-cost means of producing aluminium foil for high quality tableware (240-270 MPa, A > 10%).

A new aluminium melt processing technology and the cause of clogging of the nozzle were investigated and improved by optimizing the casting medium. High-temperature intermediate annealing improves the microstructure uniformity of the strip, refines the grains and significantly decreases the recrystallization temperature (compared with cold rolling without intermediate annealing). The performance of the products was also improved remarkably.
