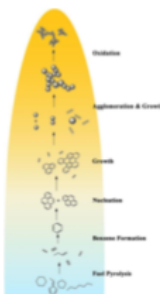
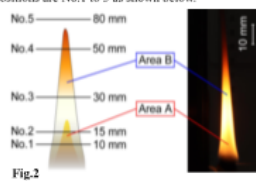
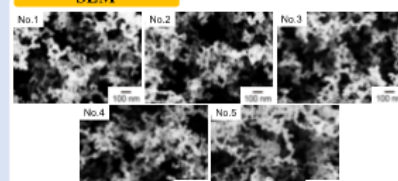
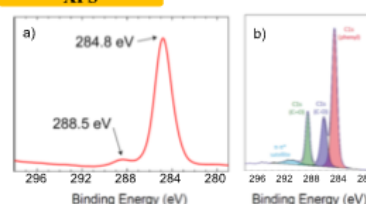


活動トピックス (記事)

タイトル	「WW L コンソーシアム構築支援事業」課題研究発表会にて英語による発表実施
年月日	2022年2月1日
内容	<p>今年度初めて実施された奈良県内の令和3年度「WW L コンソーシアム構築支援事業」課題研究発表会において、「煤形成メカニズムの追究」に取り組む本校研究グループが英語で発表しました（オンライン形式）。当研究グループは、既に査読付英文誌への投稿もしており、今後、さらに研究を重ね、外部発表も積極化していく予定です。</p> <div data-bbox="454 660 1289 1836" style="border: 1px solid black; padding: 10px;"> <h3 style="text-align: center;">Analysis of Soot Formation in a Diffusion Flame Using Rapeseed Oil -Toward Elucidation of the Mechanism of Soot Formation-</h3> <p style="text-align: center;">Minto Lian¹, Shoko Kume¹, Masaki Tsutsumizu¹, Reo Baba², Yuki Kishida², Manabu Fujiwara³, Sumiaki Nakano^{1,2} ¹Nara Senior High School, ²Kyoto University, ³Ryukoku University</p> <div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <h4>Introduction</h4> <p>Traditional solid sumi ink is made mainly from glue and soot.¹ Soot in particular affects the ink quality.² Traditionally, all the processes are done by hand on the intuition of the craftsmen. However, the demand and production of solid sumi ink is decreasing year by year, and the traditional technique is in jeopardy. To sustain the technique and apply it to other fields, a scientific understanding of the mechanism of soot formation is essential. Models of the process of soot formation, for example Fig.1, are reported, but they are generalized and experimental verification is insufficient. We analyzed the soot by SEM to observe shape changes and by XPS to verify soot oxidation in a flame.</p>  <p style="text-align: center;">Fig.1 Process of soot formation.³</p> <h4>Method</h4> <h5>Sample preparation</h5> <ul style="list-style-type: none"> Sampling soot from burning rapeseed oil on Cu plates (20 × 20 × 0.5 mm) Sampling positions are No.1 to 5 as shown below.  <p style="text-align: center;">Fig.2 Flame area classification by the difference in brightness and position for inserting the Cu plates.</p> <h5>SEM</h5> <ul style="list-style-type: none"> SU-8000 (Hitachi, Japan) Acceleration Voltage: 2.0 kV Target Sample: No.1~5 <h5>XPS</h5> <ul style="list-style-type: none"> ESCA-1660R (Ulvac-phi, Japan) X-ray source: Mg Kα (1253.6 eV, 400 W) Target Sample: No.1 </div> <div style="width: 45%;"> <h4>SEM</h4>  <p style="text-align: center;">Fig.4 SEM images of soot adhered on the Cu plates.</p> <p>The soot adhered in Area B for all the samples is random agglomeration of particles approximately 50 nm in diameter and there is no difference in their shape and agglomeration state among all the samples.</p> <p style="text-align: center;">Formation of soot shape is already developed sufficiently in the bottom of Area B.</p> <h4>XPS</h4>  <p style="text-align: center;">Fig.5 a) C1s spectrum of soot on No.1. b) Standard C1s spectrum of PET.</p> <ul style="list-style-type: none"> 2 peaks were seen in the C1s spectrum of soot on No.1. Strong peak (284.8 eV) → C-C peak Weak peak (288.5 eV) → C-O peak <p style="text-align: center;">Oxidized soot was present in the bottom of Area B.</p> <p style="text-align: center;">Soot oxidation starts from the bottom of Area B.</p> <h4>Conclusion</h4> <p>Soot formation occurs in the outside of a flame, and soot agglomeration and growth are already developed sufficiently in the bottom of the outside of the flame. It is said that soot oxidation occurs at the top of the flame,⁴ but in our study, oxidized soot is present in the bottom of Area B. This suggests that it starts from the bottom of the flame. Our study will be of use to clarify the mechanism of soot formation and therefore in the retention of traditional sumi ink making.</p> <h4>Acknowledgments</h4> <p>We are grateful to Kohjin Co., Ltd. for providing us with valuable knowledge about soot ink making and samples of soot and ink. This work was supported by Kyoto University New Technology Hub in "Nanotechnology Platform Project" sponsored by the Ministry of Education, Culture, Sports, Science and Technology, Japan.</p> <h4>References</h4> <p>1 G. Murai, <i>Artisanal Ink Production</i>, <i>Kenkyu Enokuzo Kenkyukai</i>, Tokyo, 1925. 2 R. L. Taylor, <i>Chemistry</i>, <i>Journal of the American Society of Color Chemists</i>, 1966, 4, 116. 3 X. G. Yang, J. Cao, Z. Gu, <i>Frontiers in Materials</i>, 2021, 8, 1-6. 4 M. L. Huggins, G. Sheng, J. Albert, J. Martin, L. A. H. Dixon, M. Yang, M. Kraft, <i>Carbon</i>, 2019, 141, 651.</p> </div> </div> <div style="text-align: center; margin-top: 10px;"> <p>Soot is formed in Area B.</p> </div> </div>
参考資料	—

発表ポスター