

第5回 電気化学キャパシタオンライン討論会のご案内

「層状遷移金属炭化物 MXene：電気化学キャパシタへの応用の可能性」

2011年に米・ドレクセル大学の Yury Gogotsi 教授により初めて報告された層状遷移金属炭化物 MXene（マキシン）は、その後の10年以上の世界的研究開発競争により、様々な合成法、多彩な組成と構造、更には各種デバイス応用が報告されるに至りました。本討論会では、MXene という材料の現在地を、新進気鋭の MXene 研究者であるパデュー大学 Babak Anasori 博士（Reilly Rising Star Associate Professor）に総括していただき、その電気化学キャパシタへの応用の可能性について議論します。

日時：2024年12月10日（火）午前10時～午前11時（Zoomによるオンライン方式）

対象：キャパシタ技術委員会会員（個人会員の指導する学生も含む） 参加費：無料

申込締め切り：2024年12月6日（金）：会員の皆様にはメールにて参加フォームをご案内します。

司会：大久保将史（早稲田大学）、知久昌信（大阪公立大学）

講演者：Babak Anasori (Reilly Rising Star Associate Professor, Purdue University)

講演タイトル：Tunable Chemistry of 2D Carbide MXenes for Energy Conversion

講演要旨

Two-dimensional (2D) transition metal carbides and nitrides (MXenes) are a large family of earth-abundant multifunctional materials with more than 80 compositions synthesized since 2011, such as Ti_2CT_x , Mo_2CT_x , Nb_2CT_x , $Ti_3C_2T_x$, $Mo_2TiC_2T_x$, and $Mo_2Ti_2C_3T_x$. MXenes have emerged as promising candidates for energy storage and conversion because their 2D surfaces are electrochemically active, combined with MXenes' hydrophilicity, high electrical conductivity, and ability to bond to molecules and nanomaterials to form hybrid structures. The electrochemical properties of MXenes can be tuned by the control of multiple variables: in the MXene formula of $M_{n+1}X_nT_x$, the transition metals (M) can be any of the groups 4, 5, or 6 of the periodic table or their combinations, X can be carbon, nitrogen, or a solid solution of both, surface terminations (T_x) can be any of the group 16 and 17, and the 'n' (MXene 2D flake thicknesses) can be 1 to 4. In this talk, I present a systematic study of over 40 different MXenes and discuss how their electrocatalytic properties can be controlled based on their compositions, 2D flake thickness and lateral sizes, the addition of adatoms, ion intercalations, the presence of defects (e.g., vacancies), and doping with heteroatoms.

講演者紹介



Dr. Babak Anasori is the Reilly Rising Star Associate Professor at Purdue University, with joint appointments at the Schools of Materials Engineering and Mechanical Engineering. Dr. Babak Anasori received his PhD from Drexel University in 2014 in the Materials Science and Engineering Department, the birthplace of MXenes. Dr. Anasori has authored more than 180 refereed publications on MXenes and their precursors, and he has been recognized as a Web of Science Highly Cited Researcher from 2019 to 2024. Dr. Anasori's research lab focuses on developing novel 2D carbide and carbonitride MXenes for various applications, including energy generation, electromagnetic interference shielding, and ultra-high temperature ceramics.