マテリアル先端リサーチインフラ利用報告書
ARIM User's Report

【Release：2026.02.26】　【Update：2026.02.26】

課題データ / Project Data

課題番号 Project Issue Number	23UT0116
利用課題名 Title	金属-樹脂異材接合
利用した実施機関 Support Institute	東京大学 / Tokyo Univ.
機関外・機関内の利用 External or Internal Use	内部利用（ARIM事業参画者以外）/Internal Use (by non ARIM members)
ARIM半導体基盤PF 関連課題 Related to ARIM-SETI	指定なし / No Designation
横断技術領域 Cross-Technology Area	計測・分析/Advanced Characterization
重要技術領域 Important Technology Area	マルチマテリアル化技術・次世代高分子マテリアル/Multi-material technologies / Next-generation high-molecular materials
キーワード Keywords	Various surface treatments,電子分光/ Electron spectroscopy,異種材料接着・接合技術/ Dissimilar material adhesion/bonding technology

利用者と利用形態 / User and Support Type

利用者名（課題申請者） User Name (Project Applicant)	陳 偉彦
所属名 Affiliation	東京大学 生産技術研究所
共同利用者氏名 Names of Collaborators Excluding Supporters in the Hub and Spoke Institutes	
ARIM実施機関支援担当者 Names of Supporters in the Hub and Spoke Institutes	
利用形態 Support Type	機器利用/Equipment Utilization

利用した主な設備 / Equipment Used in This Project

利用した主な設備 Equipment ID & Name	UT-308：多機能走査型X線光電子分光分析装置(XPS)with AES

報告書データ / Report

概要（目的・用途・実施内容） Abstract (Aim, Use Applications and Contents)	In order to achieve direct bonding between metal and polymer, it is significant to perform surface treatment on the metal surface to form special nanostructures. It is necessary to analyze the chemical composition of the treated metal surface to analyze the formation mechanism of nanostructures, and to investigate the existence of chemical bonding at the joining interface.
実験 Experimental	Through XPS experiment, a survey scan was conducted to figure out the elemental composition and proportion of treated metal surfaces. In addition, nano scan of C, O, Cu element was furthed conducted to analyze the chemical composition of the produced nanostructures.
結果と考察 Results and Discussion	C, O and Cu existed on the treated copper surface, and Si disappeared compared to the untreated samples. The chemical composition of treated surface varied with different treatment time. When treatment time was relatively short, the chemical composition was CuO2. With longer treatment time, the chemicals changed to CuO.
図・表・数式 Figures, Tables and Equations	
その他・特記事項（参考文献・謝辞等） Remarks(References and Acknowledgements)	We thank Dr. OKITSU for his kind help and instruction for performing XPS experiments.

成果発表・成果利用 / Publication and Patents

DOI（論文・プロシーディング）[1] DOI (Publication and Proceedings)	Weiyan Chen, Heat treatment induced strength improvement of the injection-molded joint between polymer and blasted steel, *Materials Letters*, **333**, 133651(2023). DOI: 10.1016/j.matlet.2022.133651
DOI（論文・プロシーディング）[2] DOI (Publication and Proceedings)	Weiyan Chen, Effect of nanostructured zinc coating on high joining strength of polymer/galvanized high-strength steel composite via injection molding, *Journal of Manufacturing Processes*, **85**, 295-305(2023). DOI: DOI: 10.1016/j.jmapro.2022.11.044
口頭発表、ポスター発表および、その他の論文 Oral Presentations etc.	
特許出願件数 Number of Patent Applications	0件
特許登録件数 Number of Registered Patents	0件