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| Nota di contenuto | Introduction -- Visible-light-mediated methane activation for steam methane reforming over Rh/TiO ₂ catalysts under mild conditions -- Direct photocatalytic oxidation of methane to liquid oxygenates with molecular oxygen over nanometals/ZnO catalysts -- General Conclusion and Future Prospects -- Curriculum Vitae. |
| Sommario/riassunto | This book demonstrates that solar energy, the most abundant and clean renewable energy, can be utilized to drive methane activation and conversion under mild conditions. The book reports that coupling solar energy and thermal energy can significantly enhance methane conversion at mild temperatures using plasmonic nanometal-based catalysts, with a substantial decrease in apparent activation energy of methane conversion. Furthermore, this book, for the first time, reports the direct photocatalytic methane oxidation into liquid oxygenates (methanol and formaldehyde) with only molecular oxygen in pure water at room temperature with high yield and selectivity over nanometals and semiconductors (zinc oxide and titanium dioxide). These findings are a big stride toward methane conversion and inspire researchers to develop strategies for efficient and selective conversion of methane to high-value-added chemicals under mild conditions. |