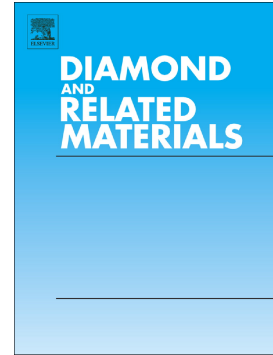


## Accepted Manuscript

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PII: S0925-9635(18)30040-2  
DOI: doi:[10.1016/j.diamond.2018.05.001](https://doi.org/10.1016/j.diamond.2018.05.001)  
Reference: DIAMAT 7105  
To appear in: *Diamond & Related Materials*  
Received date: 19 January 2018  
Revised date: 13 April 2018  
Accepted date: 1 May 2018

Please cite this article as: Lucky Krishnia, Pawan K. Tyagi , Growth and characterization of polycrystalline diamond films on silicon using sugarcane bagasse as carbon precursor at atmospheric pressure by thermal chemical vapor deposition. The address for the corresponding author was captured as affiliation for all authors. Please check if appropriate. *Diamat*(2017), doi:[10.1016/j.diamond.2018.05.001](https://doi.org/10.1016/j.diamond.2018.05.001)

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# Growth and characterization of polycrystalline diamond films on silicon using sugarcane bagasse as carbon precursor at atmospheric pressure by thermal chemical vapor deposition

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## Abstract

Here we demonstrate that by using sugarcane bagasse as a carbon precursor, highly crystalline diamond films possessing H3 [N-V-N] and [Si-V] optical centers can be grown on Si (100) substrates using a simple thermal chemical vapor deposition (thermal-CVD) system at atmospheric pressure and reduced temperature (~900 °C). In this process, the rich chemistry of effluent gas species produced during the pyrolysis of sugarcane bagasse is found to play a vital role. Diamond films have also been characterized by using X-ray Diffraction (XRD), scanning electron microscope (SEM), micro-Raman, and photoluminescence (PL) spectrometer. Presence of nitrogen and silicon related defect was probed by PL and H3, i.e. [N-V-N] at 505 nm and [Si-V] at 736 nm optical centers have been confirmed. The other observed peak at 445.7 nm, 468 nm, and 884 nm assigned to nitrogen-containing defects.

**Keywords:** Diamond growth, Thermal-CVD, H3 and [Si-V] center

## 1. Introduction

Due to the outstanding combination of mechanical properties such as very high hardness including a low coefficient of friction and high wear resistance as well as electronic<sup>1-3</sup>, optical<sup>4</sup>

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