The four parts of the Introduction

（1）环保、可持续、健康是人们一直关注的主题。  
（2）沥青材料VOC研究的意义与研究现状。  
（3）环氧沥青是一种高性能的路用特种铺装材料（钢桥面等）；环氧沥青热拌环氧沥青和温拌环氧沥青；环氧沥青在施工时会释放大量有害气体，对环境和施工人员造成负面影响，但是目前对其释放量的、释放有机物的类别仍缺乏研究。  
（4）本文研究内容和研究方法。

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(1) 环保、可持续、健康是人们一直关注的主题

Asphalt binders are produced as a byproduct of the petroleum production, and is widely used in the road pavement especially in the surface pavement. It performance well in road pavement and nowadays about xxx asphalt is produced per year and over 85% is used in the road pavement.[2]

Although the asphalt perform well in road building, however the mixing progress to produce asphalt mixtures and serving period of asphalt mixture will release some toxic emission which is harmful to both workers and environment.

The asphalt production always include some lightweight compounds. Those compositions can be released during the process of mix and serve which is also known as emission.[3] The compositions of emission include CO, CO2, SOx, NOx, volatiles organic compounds(VOCs) and polycyclic aromatic hydrocabons(PAH) [4-7] Those compositions are all harmful to people and the environment. Some researches focus on the influence of VOC on the workers, VOC may lead to mucosal irritation , skin irritation, rash, nausea, stomach pain, decreased appetite, headaches, and fatigue on occupational exposures as reported[8].

(2)

沥青材料VOC研究的意义与研究现状。

VOC对人体会产生伤害，会对环境产生伤害

对于VOC成分的研究，对于VOC定性定量的研究与评价

研究意义：

Voc的排放会导致沥青性能的劣化缩短沥青的寿命The VOC released during the high ambient temperature mixing progress and the long-term service process will lead to the degradation in the performance and reducing the life expectancy.[9]

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TLC-FID方法本用来研究VOC排放对沥青性能的劣化：Thin-layer chromatography with flame ionization detection(TLC-FID) has been used to study the influence of VOC emission during service process on the asphalt chemical component, it shows that VOC emission can change chemical components of asphalt.[10]

GC-MS方法被用来定性、定量的研究VOC：Gas chromatography coupled to mass spectrometry(GC-MS) has been developed to identify the VOC from asphalt. A analysis system which can separate VOC according to the weight has been designed, and selective ion monitoring(SIM) mass spectrometry is used to detect specific VOC at trace level. With using the ratio of the primary ion area of molecule (specific analytes) to the primary ion area of internal standard, the relatively concentration of specific molecule can be calculated. The results showed that the temperature of industrial mixing and the oxygen content is key parameter to control to reduce the VOC emission, the GC\MS is a highly sensitive detection method and can identify the VOC. [11]

How to evaluate the amount of VOC emission is always a heated topic. Some studies utilize different method to determine the composition and amount of VOC emission.

The ultraviolet and visible spectroscopy (UV-VIS) has been studied to evaluate the VOCs emission amount from asphalt by conditions of high temperature and non-high temperature. By drawing the standard curve(linear relationship between the VOC quality of the absorption solution and its absorbance value), the VOC quality of samples can be calculated. [1]

(3) 环氧沥青是一种高性能的路用特种铺装材料（钢桥面等）；环氧沥青热拌环氧沥青和温拌环氧沥青；环氧沥青在施工时会释放大量有害气体，对环境和施工人员造成负面影响，但是目前对其释放量的、释放有机物的类别仍缺乏研究。

环氧沥青是一种高性能的材料：Research has proved that Epoxy asphalt mixtures are excellent materials for deck paving on steel bridges. [11]

环氧沥青主要是有A组分和B组分组成[12] The epoxy asphalt binder always include two components, component A is an asphalt material with curing agent, and component B is an epoxy resin.

搅拌的时候会产生大量的有害气体：The asphalt viscosity must be reduced by increasing the temperature to mix asphalt with aggregates. And the high temperature environment will lead to oxidation reaction in the interface and asphalt fume will be released. The Asphalt fume include gaseous emissions and VOC[1a].

大跨径钢桥对于铺装性能要求极高:Long span[13]

Appendix:

[1]: Evaluation of Volatile Organic Compounds from Asphalt Using

UV-visible Spectrometer

[2]

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[10] Influence of VOC Emission on Asphalt Components

[11] Theory and method of deck paving design for long-span bridges.

[12]Development-of-a-lightweight-epoxy-asphalt-mix\_2013\_Construction-and-Buildin

[13]Design of deck pavement for long-span steel bridges

[1a] Characterization of asphalt fume composition by GCMS and effect of temperature